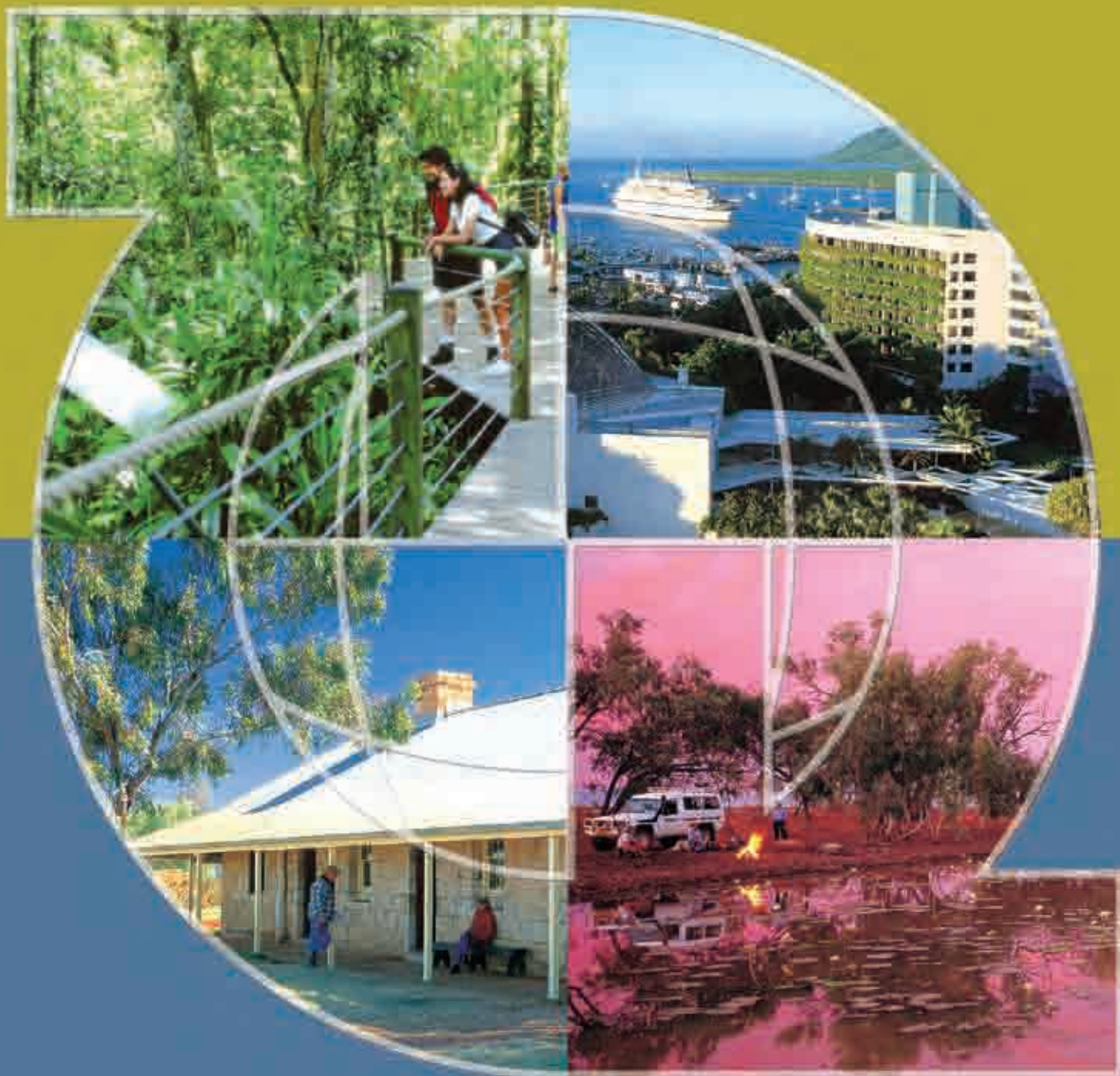


**SOCIO-ECONOMIC IMPACTS OF SANCTUARY ZONE CHANGES
IN NINGALOO MARINE PARK**
A preliminary investigation of effects on visitation patterns
and human usage



Jeremy Northcote and Jim Macbeth

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List of Abbreviations and Acronyms

ABS	Australian Bureau of Statistics
ACF	autocorrelation function
ANOVA	analysis of variance
DEC	Department of Environment and Conservation
DOF	Department of Fisheries
DPI	Department of Planning and Infrastructure
CALM	Department of Conservation and Land Management
CCF	cross correlation function
SD	standard deviation
IVS	International Visitor Survey
LGA	local government authority
MPA	Marine Protected Area
N	number
NVS	National Visitor Survey
P	probability value
PACF	partial autocorrelation function
R ²	squared multiple correlation coefficient
SARIMA	seasonal auto regressive integrated moving average
STCRC	Sustainable Tourism Cooperative Research Centre
TRA	Tourism Research Australia
TWA	Tourism Western Australia
WAPC	Western Australian Planning Commission
χ^2	chi square coefficient

SUMMARY

Objectives of Study

In mid-2005 the project team was commissioned with the task of gathering baseline data to assess potential socio-economic impacts from the expansion of sanctuary zones in Ningaloo Marine Park on visitors and residents in the Northern Gascoyne and to make a preliminary assessment of any short-term impacts.

Sanctuary zones are areas where commercial and recreational fishing are not permitted. With off-shore recreational fishing (referred to as ‘boat fishing’ in this report) and, to a lesser extent, extractive-based diving, being popular activities undertaken by residents and also visitors to the Northern Gascoyne region of Western Australia, it was the task of the project team to gather baseline data on human usage of the Marine Park against which later studies might be assessed. The sanctuary zones were gazetted at the end of November 2004, with legislation enforcing restrictions on recreational fishing within the zones introduced in September 2005. It emerged during the course of the study that at least some visitors were under the false impression that sanctuary zone restrictions were already in force in December 2004. This obviously places a question mark over the degree to which ‘baseline’ data collected prior to September 2005 could be considered a pristine, pre-change measure of human usage, with sanctuary zone extension impacts perhaps already commencing before the beginning of the project period. For this reason, the project team incorporated various retrospective data-gathering methods to determine a baseline measure.

During the course of the project, it was also realised that data sources were relatively poor for the Ningaloo region, and that a significant part of the problem seemed to be a lack of awareness and commitment to robust social and economic monitoring by key agencies. Therefore, an additional objective, devised later in the project, was to propose a set of recommendations for policy makers in order to prioritise the need for robust social and economic monitoring beyond (and complementary to) external research initiatives such as the CSIRO Ningaloo Cluster Project which is now underway.

The report seeks to cater to two types of readers—those who are interested in the particular changes that resulted from the sanctuary zone changes to the Ningaloo Marine Park, and those that are interested in the challenges of tourism monitoring and socio-economic impact assessments in protected areas and regional destinations more generally. A key principle put forward in the report is that to understand the effects of any one factor on visitation in a region (in this case, sanctuary zone changes), the effects of all other relevant variables affecting visitation to the region also need to be comprehensively understood, if only for the purpose of ruling out confounding factors. Like most regional tourism destinations in Australia, a range of theories (one might call them ‘myths’) circulate regarding the key factors underlying visitation patterns in the Northern Gascoyne, and it was perhaps coincidental that radical shifts were occurring with some of these factors, such as rising fuel prices and changes in the international and domestic tourism markets, at the same time as the new Ningaloo Marine Park Management Plan came into effect. Disentangling the potential impacts from these different factors was an important task for the project team. Consequently, within the limitations of the available data sets, the report offers a cursory understanding of tourism patterns in the Northern Gascoyne that will be of use to various stakeholders interested in matters above and beyond sanctuary zones and impact assessments.

Methodology

With the Marine Park stretching for 260 kilometres of coastline between the towns of Exmouth in the north and Carnarvon in the south, it was necessary to limit the study area to a manageable size. The Shire of Exmouth was chosen as the primary area of focus, due to the town being considerably dependent on tourism for its economy, and also due to the fact that the sanctuary zone changes were more extensive in the north of the Marine Park than they were in the south. Primary data involving

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visitor and resident surveys and secondary data involving visitation indicators were collected and analysed in order to determine visitor patterns in the Exmouth area and along the Ningaloo Coast, particularly adjacent to the pastoral station leases.

In September–October 2005, 135 Shire of Exmouth residents were surveyed about their views on the sanctuary zones and the extent to which the changes might impact on their activities. The survey involved a mail-out procedure using a random sample of one in five resident adults in the Shire of Exmouth. Unfortunately, the effect of response bias could not be controlled in the survey, and so the possibility that the sample was dominated by residents with strong feelings about the sanctuary zone changes (whether for or against) could not be ruled out from the results. It was also not realised at the time of the survey that residents themselves may have not been fully aware of the delay in legislation enforcing the regulations in the new areas covered by the sanctuary zones. Whether because of this reason, or because of voluntary changes, the survey findings showed that some significant realignment of activities had already taken place. Interpretation of the findings should therefore be made with these limitations in mind.

In July 2006 a survey was carried out with 358 wilderness campers along the Ningaloo coast (ten months after legislation enforcing the sanctuary zones had been introduced). The aim of the survey was to assess short-term effects of the extension of the sanctuary zones on human usage of the Marine Park, and to compare this with the results of a camping survey conducted in 2002. The 2006 survey was intended to be a full census involving all campers along the coast. However, only the two largest pastoral stations, Warroora Station and Ningaloo Station fully participated, with a small sample of campers (59 respondents) participating from Cape Range National Park. Because the station campers were surveyed by the station managers, who have publicly expressed strong opposition to expansion of the sanctuary zones, the project team cannot be certain that all campers were actually surveyed, and the possibility of a response bias (with those antagonistic to the sanctuary zone changes possibly overrepresented in the survey) should also be kept in mind when interpreting the results.

In addition to surveying wilderness campers and Exmouth residents, a range of data from two 2002 visitor surveys of wilderness campers were re-analysed and reconstituted as baseline data over a longer time period. Finally, a range of visitor data—including vehicle counts to the National Park, camping revenue, Visitor Centre door entry counts and aerial surveys of pastoral station camps—was collated and analysed in order to detect changes to visitation levels. This data was initially inspected for visitor trends, and then analysed by a team of time series experts in order to detect finer level changes. As a means of distinguishing localised effects from wider factors, some visitation data was drawn from Shark Bay in order to serve as a control group for comparison with the Ningaloo Coast.

Key Findings

From statistics provided by Tourism Research Australia for 2004 to 2005, it is estimated that 90,000 visitors converge on the Shire of Exmouth per annum, although this volume fluctuates. Approximately 30,000 visitors participate in recreational fishing. While the value of recreational fishing to regional tourism is a difficult matter to determine, it is clear that certain visitor markets, such as intrastate visitors, place a high value on recreational fishing as core to their visitor experience. However, a key finding of the project is that visitor experience is related to a general ‘wilderness experience’ in which recreational fishing is one of a constellation of activities that contribute to enjoyment of their holiday. The value placed on recreational fishing cannot be readily disentangled from other activities such as camping, swimming, enjoying nature and viewing wildlife that collectively form the ‘Ningaloo experience’. What this probably means is that fishing visitors have some resilience to changes in fishing regulations. However, it would be naïve not to think that at some point, changes may be of such a degree that some visitors decide to forego the Northern Gascoyne as their preferred holiday destination. Understanding visitors’ level of satisfaction with the changes to the sanctuary zones and their intention to revisit the region was therefore a key objective in the surveys that were carried out for the project.

The wilderness camping survey indicates that, in the case of a core group of long-term fishing

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visitors at least, the sanctuary zone changes may have resulted in some modification of boat fishing activities and some localised displacement in terms of camping location. However, with the possible exception of a temporary downturn in wilderness camping in the Ningaloo station area during 2005 (the cause of which could not be determined), there appears to have been no sustained downturn in camping numbers along the Ningaloo coast, with levels having returned to normal in the early half of 2006. These are admittedly very short-term findings, and it is important that, before any firm conclusion regarding impacts from sanctuary zone extensions can be made, follow-up surveys are carried out in the future. The results of the survey also indicate that wilderness campers feel inconvenienced by the changes (with 80.1% of Ningaloo campers, for example, claiming to have been impacted by the changes), but not to the point that they do not wish to return to the region in the future, with 99% of campers indicating that they would visit the area again in the future. In fact, visitor satisfaction among campers for the Ningaloo Coast was extremely high (98.2% for Ningaloo campers and 94.8% for Warroora campers).

A theory referred to as the 'threshold of tolerability' is proposed which states that the more destination conditions change in ways that are contrary to visitor expectations, the more visitors will seek out alternative destinations (first locally, second regionally) or, alternatively, refrain from the activity altogether. In the case of Ningaloo, wilderness campers seem to have undergone the first stage of local redistribution but not the second of regional dislocation, indicating that the magnitude of the sanctuary zone changes are, for the time being at least, within their threshold of tolerability. This is partly attributed to the wide range of activities that wilderness campers engage in as part of the 'Ningaloo experience', even though recreational fishing is for many a key component of their visit to the Marine Park.

The survey of residents of the Shire of Exmouth found that over half of respondents (54.5%) were generally unhappy with the sanctuary zone changes and 57.6% felt that the activities of themselves or household members would be (or had been) affected, with some being forced to shift their boat fishing and cray diving activities. While it is possible that there was a response bias towards residents who had been mostly affected by the sanctuary zone extension, it is interesting to observe that these residents continued to visit the Marine Park in large numbers for a variety of activities, and from this perspective the sanctuary zone impacts had, at the time, been minimal in terms of rate of visitation by those mostly affected by the changes. The resident survey indicates that, amongst those dissatisfied with the changes, the opposition is directed particularly to the perceived *process* by which the sanctuary zone management plan was devised and implemented, and not so much to the principle of sanctuary zone protection itself. It is noted that external regulation is intricately related to satisfaction, with freedom and unhindered interaction with the natural environment being core to the 'Ningaloo wilderness experience' for both local residents and wilderness campers, and these principles being inherently in conflict with direct management techniques such as sanctuary zone exclusions. It is suggested that such feelings are less derived from anti-environmental attitudes but more from an attitude (one might say an 'ethos') of rugged individualism in regional areas such as the Northern Gascoyne. The degree to which this mindset adapts to incremental regulatory controls such as those relating to recreational fishing is a key issue for protected area managers, and one of the reasons why visitors and community responses to sanctuary zone regulation need to be closely monitored.

Future Action

Continued monitoring is important to understand long-term changes to visitor activity that may result from planning and management decisions concerning the Ningaloo coast. The impact assessment uncovered significant inadequacies in the level of understanding of visitor patterns in the Northern Gascoyne and the ability of agencies to monitor tourism activity and its social and economic impacts. It is recommended that the following matters be given strong attention by management authorities:

- recognition of the importance of robust research and evaluation in future management policies;
- promotion of stronger interagency collaboration;
- establishment of closer community partnerships in planning and management;
- implementation of compulsory and systematic data collection and reporting procedures; and
- provision of a central data collection and access point.

Such measures are seen to be the key for understanding not only impacts from management decisions such as sanctuary zones, but also other local and external factors that affect visitation to the region.

The project team also suggests the following improvements be made to existing data gathering activities by agencies in the region:

- Aerial surveys should be conducted more regularly.
- Metro-count recordings in Cape Range National Park should be supplemented by random surveys of visitors by entry gate staff.
- Camping receipts need to be collected from both the National Park and the pastoral stations. An electronic method of storing receipt data is required.
- Visitor Centre bookings data need to be systematically collected and stored.
- Recreational fishing surveys by the Department of Fisheries need to report on fisher numbers and origins, not just fishing effort.
- Tourism satellite accounts need to be produced for the region.
- Visitor surveys of different market segments (such as those staying in commercial caravan parks and hotels/motels) need to be carried out.
- Residential surveys need to be conducted periodically.
- Comparison data for Shark Bay should be collected to distinguish local effects from regional effects.

The project team holds that these measures are essential if informed planning and management of the Ningaloo coast is to be undertaken in the face of rapid changes in the Ningaloo visitor market.

Chapter 1

INTRODUCTION

Background

In November 2004, the Western Australian State government approved the expansion of sanctuary zones in Ningaloo Marine Park, which effectively increased the area protected by sanctuary zones from 10% of the previous park territory to 34% of the new territory. Sanctuary zones are ‘no take’ areas where recreational fishing is not permitted. Legislation enforcing these restrictions was passed in September 2005.

Given the size of the Ningaloo Marine Park (some 5000 square kilometres), the sanctuary zone expansion represented a significant amount of new territory that suddenly became off-limits to recreational boat fishers, many of whom were visitors holidaying in the region, but some of whom were residents in nearby towns. During the course of public consultation leading up to the approval, there was a fear expressed by some sections of the community (particularly recreational fishing groups) that the expansion would not only limit their own activities, but lead to a downturn in visitation to the region and, in turn, the regional economy (CALM, 2005a).

The Significance of the Report

The determination of the impacts of sanctuary zone expansion is important not only for future management and planning decisions related to the Ningaloo Marine Park, but for the planning of all Marine Protected Areas (MPAs) that incorporate areas of popular fishing activity. MPAs have been established in several regions around Australia. The creation of MPAs, which place restrictions on commercial extraction activities such as commercial fishing and mining, has raised the matter of fair compensation to affected communities, as outlined in the Australian Government’s policy statement on Marine Protected Areas (MPAs) and Displaced Fishing in January 2004. According to the Bureau of Rural Sciences (2005):

That policy recognises that the declaration of MPAs may have adverse social and economic impacts on sections of the community, and that in such circumstances there may be grounds for providing structural adjustment assistance. As stated in the policy, this is because the declaration of an MPA is a resource allocation process whereby marine resources are effectively reallocated from generating a private benefit such as fishing to a broader public good of biodiversity conservation. (BRS 2005:4).

The introduction of sanctuary zones within MPAs, which are concerned with regulating recreational extractive activities such as recreational fishing, is not addressed in this policy. In fact, there has been little recognition given to the possibility that sanctuary zones may have short-term negative effects on economic returns, namely, a loss in tourism revenue resulting from a downturn in visitor segments associated with recreational fishing. Some might argue that such a loss is more than compensated for by the gains in environmental protection and non-extractive based visitation (e.g. ecotourists and international sightseers) that such protection sustains, which is vital for tourism in the long-term, including fishers who are dependent on sustainable fishing stocks. However, it needs to be borne in mind that should any loss of visitors result from over-protection, this would be a net loss all round. Further, there is also the matter of a loss of social benefit that may arise from significant areas of popular fishing areas becoming off limits to recreational fishing, both to tourists and to local residents. Many residents move to these areas for lifestyle reasons, including the opportunity to engage in outdoor activities such as recreational fishing. The issue of social impacts are often ignored in cost-benefit assessments, but need to be considered along with economic and environmental benefits if true sustainability is sought for destinations (Northcote & Macbeth 2006).

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The notion that the expansion of sanctuary zones may result in detrimental economic and social costs is a view that was current among some sections of the Exmouth and Carnarvon community during the lead-up to the November 2004 decision to expand the existing sanctuary zones in Ningaloo Marine Park. These concerns are publicly documented in the submissions by individuals and community groups to the draft management plan that was put out for public comment in 2004 (CALM, 2005a:56). In response to this claim, CALM management took a rather different view, stating:

There is likely to be significant economic benefits by protecting these values. Recreational fishing is still permitted in most of the reserves (70%), so it is unlikely that visitation will fall as a result of the new management scheme (CALM, 2005a:56).

Determining whether losses to visitation and tourism revenue have occurred as a result of the expansion of the sanctuary zones is the basis upon which the present study was commissioned.

Impact Assessment

The commencement of the project began some ten months after the November 2004 decision to expand the sanctuary zones and in the same month that legislation enforcing the regulations surrounding the sanctuary zones was introduced (that is, September 2005). During the course of the project, there was a concern conveyed to the project team by some Exmouth business managers that visitors had not been clearly advised that fishing was still possible in the areas marked for sanctuary zone extension in the period from November 2004 to September 2005. This raised the possibility that some realignment of activities had occurred at least nine months before the project commenced. As a consequence, the project team was compelled to rely on data compiled in the course of previous research and record-keeping activities to establish a baseline. This retrospective approach raised certain challenges and entailed some limitations on the impact assessment. First, it meant that the project team had to make-do with rough and ready measures that were not purposely designed for an impact assessment of the sanctuary zone expansion. Second, it limited the measures that could be employed for post-change follow-up, given that indicators for after-effects had to be consistent with pre-effect indicators. While retrospective impact assessments are not ideal for obtaining robust findings, practicalities often mean that impact assessments of this type are all that is possible, and hence it is hoped that the present undertaking represents a good case study of one way to conduct this form of impact assessment.

According to the Bureau of Rural Sciences (2005:6), the decision to undertake monitoring of Marine Protected Areas is determined by consideration of several factors:

- the likely level of perceived impact on fishing activities and community concern
- the value of the fishing affected
- the numbers of fishers potentially affected
- the level of community dependence on the resource
- the level of individuals' dependence on the resource
- the availability of suitable existing data.

The project was certainly motivated by the local community's alleged dependence on the Marine Park and concern among some segments of the community, particularly recreational fishers and those business operators who felt dependent on the recreational fishing tourism market. However, the project team had little knowledge of the value of the fishing activity potentially affected, the likely level of perceived impact on fishing activities, or the availability of suitable existing data. Consequently, the project team had to spend a considerable amount of resources and time establishing what data sources were available and what value recreational fishing contributed to the region before it could consider the level of impact. Accordingly, the aims of the project were quite broad, and went beyond gathering baseline data, by also including an assessment of the value of the data that already existed in terms of its suitability for long-term

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monitoring. Because the prime interest of DEC and Tourism Western Australia was on impacts concerning visitation patterns, it was also necessary to explore the value of tourism to the region, which itself was poorly understood prior to the project commencing. The reconstruction of a visitor profile for the Ningaloo coast therefore became an important task for the project team. With a thorough understanding of tourism patterns, recreational fishing activities and available data sources, the project team believed that it would be in a strong position to tackle the specific terms of reference established for this project, which, in addition to collecting baseline data and determining whether visitation had, in the short term at least, been affected by the sanctuary zone changes, were to:

- develop a set of appropriate social and economic indicators for the Ningaloo Coastal Region for long-term monitoring of zoning changes
- identify the range of 'external' factors likely to confound the effects caused by changes to Marine Park boundaries
- develop a methodology for future impact assessments.

During the course of the project, it was realised that a significant part of the problem of data quality seemed to be a lack of awareness and commitment to robust social and economic monitoring by key agencies. This is a much broader and more problematic issue than the specific challenges of devising an appropriate methodology for the particular project. Further, the announcement of an \$8 million funded CSIRO Ningaloo Cluster Project to examine the environmental and social impacts from management of Ningaloo obviated the need for a detailed methodological proposal that, one would hope, will be thoroughly achieved by the project team involved in the Cluster Project. Therefore, an additional objective, devised later in the project, sought to propose a set of recommendations for policy makers in order to prioritise the need for robust social and economic monitoring beyond (and complementary to) external research initiatives such as the Cluster Project.

Given the limitations on time and funding, and in light of the paucity of small area data for the Northern Gascoyne region, it was decided that gathering baseline data for the entire Ningaloo region, with its wide geographical area and myriad of visitor segments, was not realistic. Therefore, the northern region, encompassing Exmouth, Cape Range National Park and Ningaloo station, was given a greater emphasis. For this reason, the results of the study should not be generalised to the southern region, encompassing Carnarvon, the Blow Holes, Coral Bay and the southern pastoral stations (with the exception of Warroora station, which was included in the pastoral station camping surveys).

Additionally, two user groups were selected for primary focus, corresponding to two distinct stakeholders in the sanctuary zone changes. These are the pastoral station campers of the Ningaloo coast, and the residents of the Shire of Exmouth. The rationale for selecting these particular groups was that they were identified as the user groups of the Marine Park most likely to be substantially affected by the sanctuary zones, given that they comprise many long-term fishers who tend to frequent the particular areas where the sanctuary zone changes occurred. It was reasoned that if these two groups are resilient enough to withstand changes to the sanctuary zones, then less dedicated recreational fishers among the broader visitor market would be even less likely to be affected (an assumption, it should be emphasised, that remains to be substantiated through more extensive surveys). It was also reasoned that residents and long-term visitors have a higher degree of sensitivity to sanctuary zone changes than one-off visitors (such as international visitors and touring caravanners). With respect to residents and long-term visitors, they already have established standards regarding their holiday experience at Ningaloo. The question from a tourism management perspective is whether or not the changes to the sanctuary zones will detract from this experience in a way that discourages them from returning in the future. The important impacts to be considered with respect to the latter group, on the other hand, relate to their conception of Ningaloo prior to choosing their holiday destination, and whether their expectations are fulfilled once they do choose to visit the region.

The question from a tourism management perspective for this group is whether the marketing appeal of Ningaloo is negatively affected by sanctuary zone changes (which will partly depend on what type of

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experience they are seeking from Ningaloo) and also whether the experience of visiting the region is satisfying enough so that they choose to engage in positive word-of-mouth marketing of the region once they return home. For example, one long-term accommodation owner in Exmouth expressed to the project team his concern that potential first-time or repeat visitors would be made to think that fishing was now spoilt because of the sanctuary zones and that visitor levels would suffer as a result. The issue of visitor levels was of particular interest to sections of industry and the community who were concerned about potential economic ramifications of the sanctuary zone changes.

Chapter 2

**THE VALUE OF TOURISM AND FISHING ON THE
NINGALOO COAST**

Introduction

The Ningaloo reef is one of the world's largest fringing reefs, stretching for 260 kilometres of coastline (Commonwealth of Australia, 2002:1). The Marine Park is home to a myriad of marine species, including 500 fish species and 600 mollusc species (Australian State of the Environment Committee, 2001). The reef is part of the migratory route for whale sharks (the only place in the world where they visit regularly in large numbers), humpback whales and turtles. The Leeuwin current flows strongly between the months of May and August each year, bringing with it larvae, eggs and juveniles of tropical species from the Indo-Pacific region to the north, although it is believed that local stocks of fish are dependent on local breeding cycles for their replenishment (DoF, 1999:22–23). The proximity of the Ningaloo waters to the edge of the continental shelf (only five kilometres offshore at the northern part) is one of the reasons that oceanic species such as migrating whales are seen close to the coast on a regular basis (Commonwealth of Australia, 2002:22).

The Marine Park is straddled by the two major townships in the region, which encompasses two local government authority (LGA) regions, bearing the same name as the major townships (see Figure 1). Exmouth, with its LGA population of 2231 people (ABS, 2001), lies to the north of the Marine Park. The township of Carnarvon, with a LGA population of 6396 people (ABS, 2001), lies to the south. Exmouth is one of the youngest regional towns in Australia. It was founded in 1967 as a Defence Forces settlement centred on the North West Cape naval communications facility and the nearby Learmonth RAAF base (established during the Second World War). Since the withdrawal of United States military personnel in the early 1990s, the town has increasingly relied on tourism as its major service industry. In fact, its population almost doubles during the peak tourism season (ABS, 2001). Even traditional pastoral stations operating along the coast have become quasi-tourism operators by hosting camping and homestead accommodation on their leases. Although Yardie Creek Station was relinquished to the Crown in 1959 (CALM, 2004:12), four other pastoral stations continue to operate adjacent to the Ningaloo Marine Park. Coral Bay, on the other hand, is a dedicated resort town that has emerged between the Carnarvon and Exmouth. Its population of 150 people is comprised of workers and business owners in the tourism industry.

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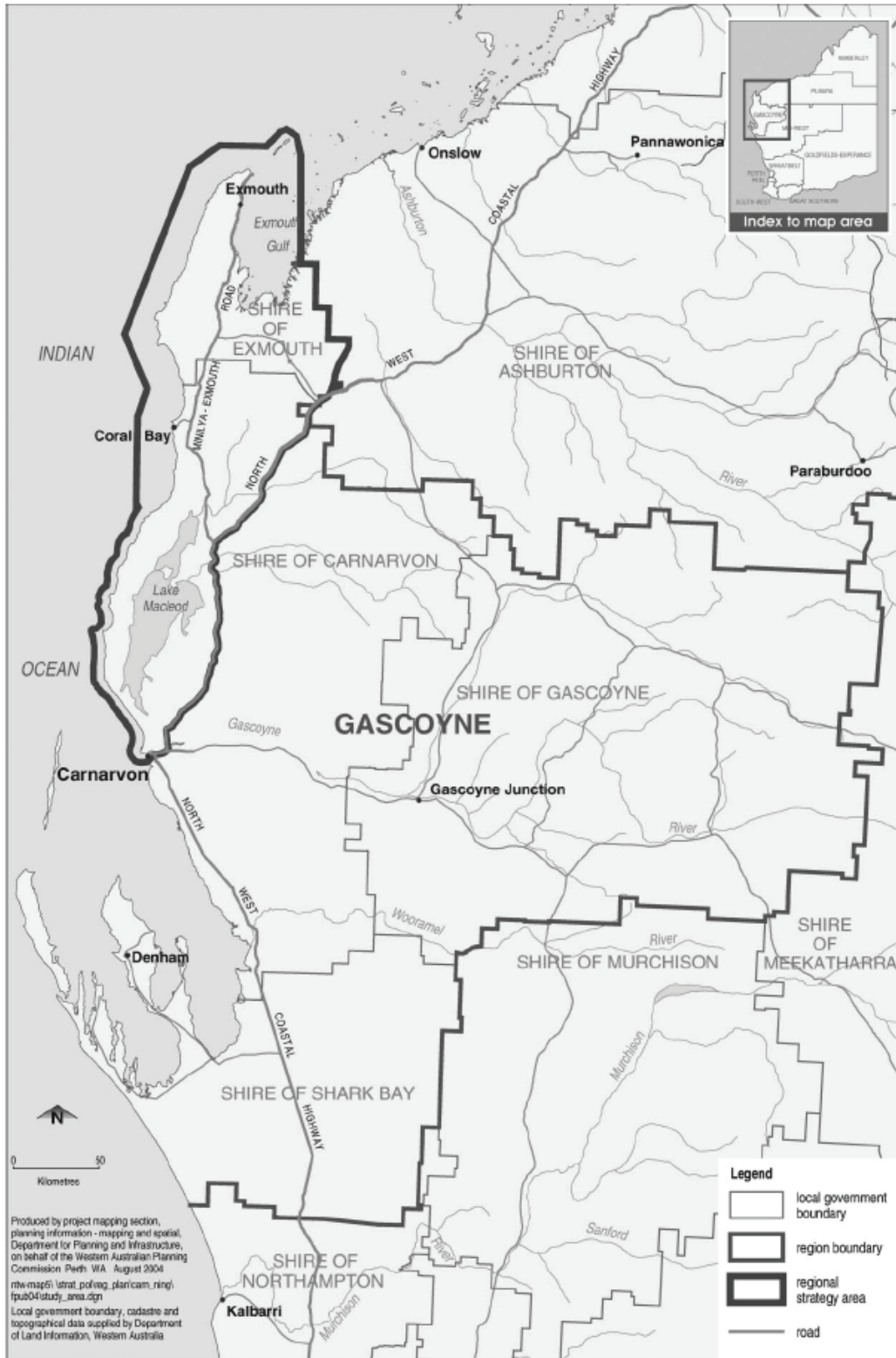


Figure 1 Local Government Area boundaries for Shires of Exmouth and Carnarvon

Source: Dept. of Planning & Infrastructure 2004

SOCIO-ECONOMIC IMPACTS OF SANCTUARY ZONE CHANGES IN NINGALOO MARINE PARK

Tourism is now a key industry in the region, contributing approximately \$172 million to the Gascoyne economy in 2003 to 2004 (Gascoyne Development Commission, 2006). Tourism is supplemented by retail trade, mining (particularly salt processing), commercial fishing, manufacturing, horticulture, construction and pastoral agriculture. Tourists are drawn to the unique marine features of the Ningaloo coast, including its bountiful fishing waters, its fringing coral reef for divers and snorkellers, pristine beaches, spectacular marine life, tropical climate and wilderness environment. Management decisions related to the Marine Park are therefore considered to have significant impacts on tourism in the region.

Management History

The growth of tourism on the Ningaloo coast in the last twenty years has brought to the fore the problem of conserving the environmental features of the region without undermining economic growth. In accordance with this, the Ningaloo Marine Park was established in 1987. The Commonwealth administers the seaward territory, where all commercial fishing is banned. The coastal territory is administered by the Western Australian State government under the management of the Department of Environment and Conservation (DEC). The boundaries of the park include 40metres inland from the high water mark in most places. Cape Range National Park, to the north of the Marine Park, was gazetted as an A-class reserve (National Park) in 1971, and covers 50,581 hectares of limestone range and floodplain to the coast (CALM, 2004). The Department of Defence is the custodian of an area of land to the south of Cape Range National Park which is a designated bombing range. In addition, four pastoral leases—Ningaloo, Warroora, Cardabia and Gnarraloo stations—are located along the Ningaloo coast to the south of Cape Range National Park, with a further pastoral lease, Quobba station, located just south of the Marine Park.

Road infrastructure is relatively underdeveloped. A sealed road extends from Exmouth south into Cape Range National Park as far as Yardie Creek. Yardie Creek is traversable by 4WD only. The road then turns into a track running south along the coast, terminating at Coral Bay. An unsealed road links Ningaloo Station to the main highway (the Minilya Exmouth Road), a sealed road links Coral Bay to the main highway, and an unsealed road links Coral Bay to Warroora Station and then from Warroora Station to the main highway. Another coastal track begins at Point Quobba, just off the Blowholes Road, but is currently closed at Gnarraloo Bay.

Apart from Coral Bay, where commercial caravan parks, resort accommodation, rental houses and a backpackers hostel are located, camping on the Ningaloo Coast is basic with few facilities. There are 13 camping areas within Cape Range National Park, accommodating approximately 110 sites (CALM, 2004:15). Each site contains a toilet and rubbish bins. Sites do not currently have potable water or groundwater, nor do they have shelter. There is also one privately operated ‘safari’ camp in the National Park. South of the National Park, the pastoral stations offer homestead accommodation and manage a number of campsites on or adjacent to their properties, which have become more well-defined in recent years as part of a major management initiative to ‘rationalise’ camping along the coast. An informal camping area is also found at the RAAF bombing range just south of Cape Range National Park.

Road access and camping sites are concentrated along the coastline, where visitors enjoy the natural attractions of the Marine Park. Boating is also concentrated in waters close to the coastline, with the protected reef serving as a haven for boat fishing and diving both within and outside the reef. Increased visitation has led to concerns among some observers about impacts on the marine and coastal environment.

The responsibility to manage the Ningaloo coastal environment falls on the Department of Environment and Conservation (DEC), formerly the Department of Conservation and Land Management (CALM). The CALM Act states that a marine park is established:

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...for the purpose of allowing only that level of recreational and commercial activity which is consistent with the proper conservation and restoration of the natural environment, the protection of indigenous flora and fauna and the preservation of any feature of archaeological, historic or scientific interest (CALM, 2003:2).

Sanctuary zones were introduced in 1991 soon after original creation of the Marine Park. Sanctuary zones are distinct from conservation zones, which do not allow any form of use, including snorkelling and diving. Ningaloo Marine Park is not a nature reserve and does not have conservation zones. Hence, sanctuary zones do not protect against direct environmental damage, such as coral disturbance caused from snorkelling and diving, reef walking and boating, or against litter, contaminants and other forms of environmental disturbance. They simply prohibit extractive based activities, such as recreational fishing and crayfish diving, or anything else that involves the removal of marine life. There are also recreation zones where recreational fishing is permitted, but no commercial fishing is allowed, in contrast to general purpose zones, where both these activities can occur, providing they accord with the conservation values of the Marine Park.

In addition to sanctuary zone restrictions, recreational fishers are subject to fishing restrictions set out for the entire Gascoyne region by the Department of Fisheries. The restrictions relate to bag size limits, possession limits, size limits and fishing method (e.g. nets). These differ from species to species and also change over time depending on estimates of fishing stock.

The 1991 sanctuary zone scheme is shown in Figure 2. Approximately 10% of the Marine Park was allocated to sanctuary zones. Zones were located at: Mandu Creek and Osprey adjacent to Cape Range National Park; between Point Edgar and Point Cloates and also south of Jane Bay (a popular camp) to the north of Bruboodjoo Point adjacent to Ningaloo Station; at Mauds Landing to Coral Bay; and south of the popular 14 Mile Camp to Pelican Point, just north of Warroora Station. DEC (then CALM) adopted the sanctuary zone scheme as a way of protecting areas that it deemed sensitive to significant ecological damage from recreational use. DEC authorities note:

At that time there was limited understanding of the ecology of NMP and the configuration, size and location of sanctuary zones needed to protect the biodiversity of the Park. Furthermore, fishing was the main reason most visitors came to the area and, as such, there was significant opposition from recreational fishers to the establishment of 'no fishing' zones. The combination of limited scientific understanding and opposition from a major user group resulted in a compromise sanctuary zone scheme being adopted for the 1989–1999 management plan (CALM, 2003:8).

With growing visitor use of the Marine Park, the initial management plan came under question from various quarters as being too conservative. With the Management Plan due for review anyway, a decision was made to substantially increase the no-take zones. The steps detailing this process are outlined in the Marine Parks and Reserves Authority's (MPRA) 2004–05 Annual Report (2005:15–16). In line with recommendations by the Townsville Declaration on Coral Reef Research and Management (Centre for Coral Reef Biodiversity, 2002) that 30–50% of the total area of a bioregion should be no-take zones, a proposal for a substantial increase in sanctuary zones was proposed (CALM, 2003:8), as well as a 17% increase in the overall area of the Marine Park, extending south from Amherst Point to Red Bluff. The revised sanctuary zone scheme and boundary extensions are shown in Figure 3.

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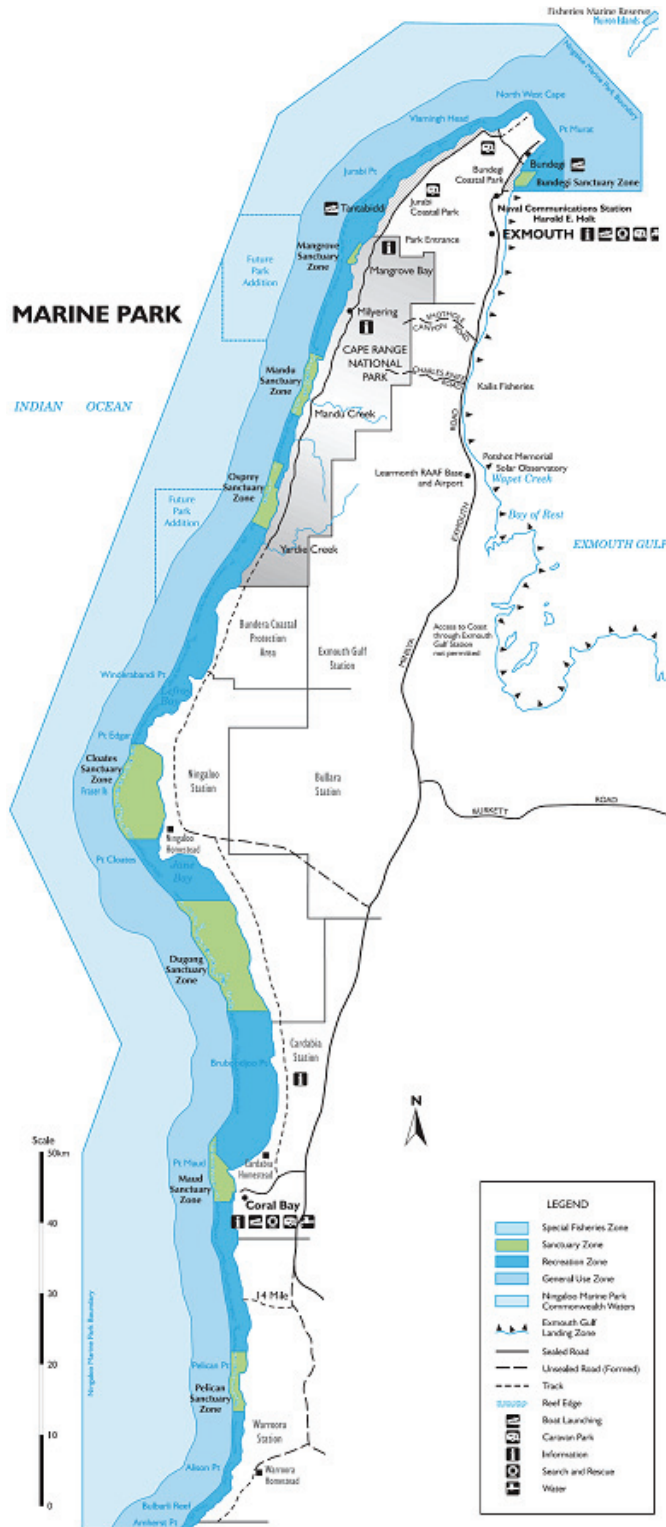


Figure 2 Map of the pre-2004 sanctuary zones in Ningaloo Marine Park

Source: DEC 1991

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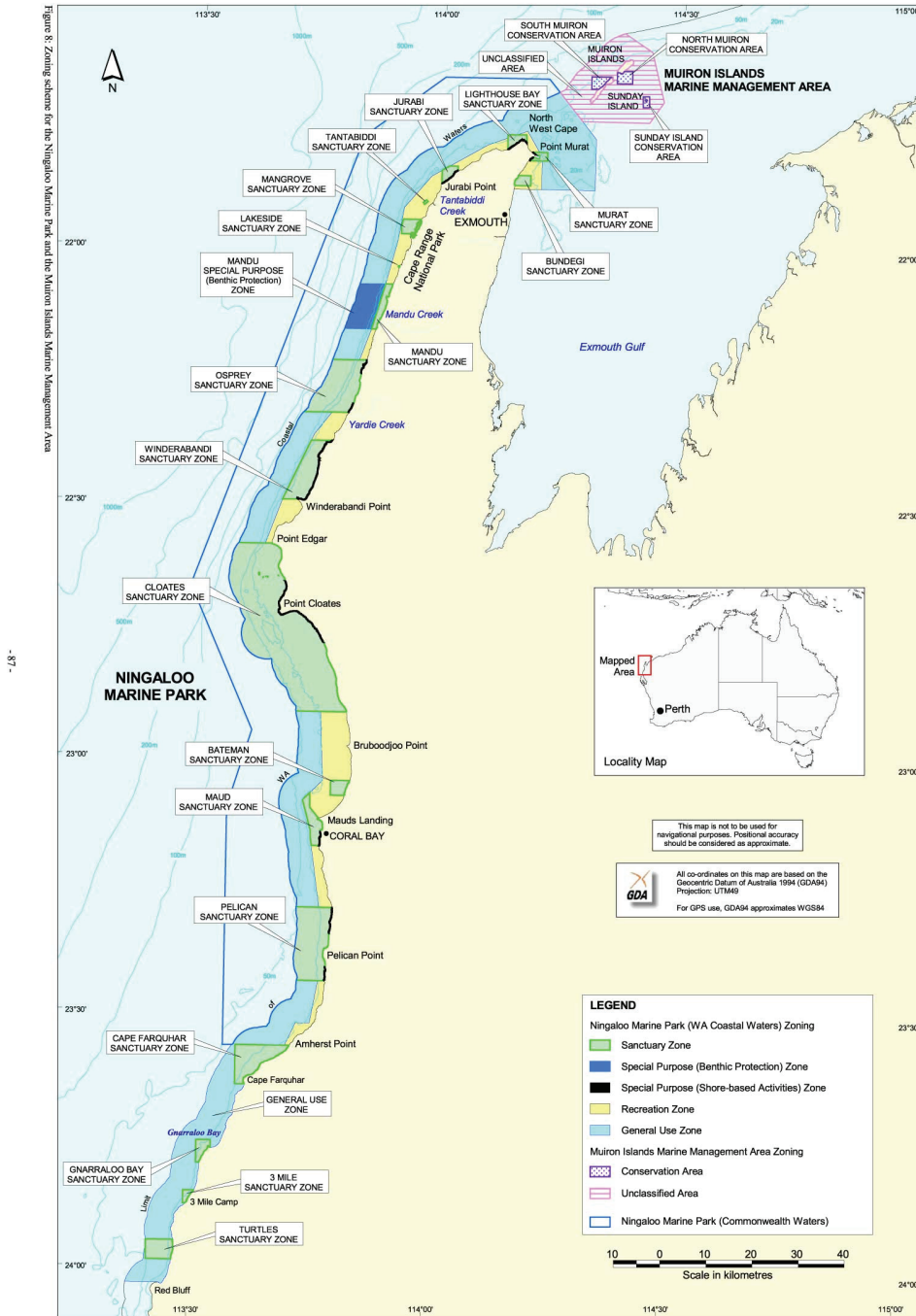


Figure 3 Map of the post-2004 sanctuary zones in Ningaloo Marine Park

Source: DEC 2005

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In deciding where to situate the extensions to the sanctuary zones, planners claimed to have exercised due consideration for recreational fishing patterns:

Changes to the sanctuary zones in the immediate vicinity of the two population centres have been limited and where new zones have been recommended, the location and boundaries have been designed to minimise restrictions on fishing in the most highly used areas (CALM, 2003:11).

The extension of the sanctuary zones took place principally off-shore, with the expanded sanctuary zones resulting in little reduction of shore area available to recreational fishing (CALM, 2003:10). Most of the new sanctuary zones were relatively small, including Jurabi, Tantabiddi, Mangrove and Lakeside sanctuary zones adjacent to Cape Range National Park; Bateman sanctuary zone north of Mauds Landing; and Gnarraloo Bay, 3 Mile and Turtles sanctuary zones in the south. Of these sites, 3 Mile Camp and Gnarraloo Bay (a popular day site) were the areas that were most likely to disrupt existing visitor activities, although the distance for boat travel to nearby general use zones was minimal. A larger sanctuary zone was created south of Amherst Point to Cape Farquhar. While the waters adjacent to the main camping areas near Warroora Station (notably Stevens Camp and 14 Mile Camp) remained open to boat fishing, extensions to the Pelican Sanctuary Zone meant that some favoured boat fishing areas were now off limits. It was the areas to the north around Ningaloo Station, however, that experienced the most extensive changes. The gap between the Bruboodjoo Point-Jane Bay sanctuary zone (to the south) and the Point Cloates-Point Edgar sanctuary zone (to the north) was closed to boat fishing, cutting off boat fishing for those staying at Jane Bay camp. This meant that those staying at Jane Bay would be required to travel a considerable distance to reach the general use and recreation zones either to the north or to the south. A newly created sanctuary zone to the north of Winderabandi Point meant that those staying in the popular Lefroy Bay area were now enclosed by sanctuary zones to the north and to the south. This was also the situation for those staying at the Bombing Range to the north of the Winderabandi-Sandy Point sanctuary zone and to the south of the newly established Osprey sanctuary zone.

While the new zonal arrangements were approved in late November 2004, the fisheries legislation for enforcement of the restrictions in the new zones did not come into effect until September 2005. As part of their statutory responsibilities, DEC is vested with the day-to-day management of the Marine Park (under the *Conservation and Land Management Act 1984*), while the Department of Fisheries (DOF) is responsible for enforcing fishing restrictions (under the *Fish Resources Management Act 1994*). Anecdotal evidence suggests that many fishers may not have been aware of the delay in legislation enforcing the zones, and that for some at least the adjustment of activities commenced from December 2004.

The key issues for some sections of the community were the potential effects of the sanctuary zone changes on their lifestyle and on their livelihood through tourism revenue. It was felt that recreational fishing was an important drawcard for the region as well as being an important component of their own lifestyle satisfaction, and that the loss of prime fishing areas would be disastrous for the region. The first task for an assessment of the sanctuary zone changes is therefore to estimate the value of tourism—and recreational fishing as a component of tourism—to the region overall, so that the significance of what is at stake can be appreciated when assessing visitor impacts.

Value of Tourism to the Ningaloo Coast

The question of what contribution tourism makes to the economy of the Northern Gascoyne is one that has been examined in the past without much success. Unfortunately, the economic data available for measuring the value of tourism for the region is inadequate, as it is for most regional areas of Australia. Further, there is no generally accepted methodology for measuring the economic benefits of tourism, regardless of the quality of data available. This is because tourism revenue from visitor expenditure needs to be seen in light of both the costs of providing services to tourists, including employment and marketing (the supply value), and also the costs borne by other industries that may lose out by a focus on tourism (the economic substitution value). There are also complexities surrounding multiplier effects, such as the way costs and

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benefits to frontline tourism services have impacts on other industries. Finally, there are issues of financial leakage, such that it is not possible to say that 'x amount' was contributed to the local economy, if a fair portion of this ends up in the hands of commercial interests located elsewhere (such as business owners based in Perth). For reasons of simplification, the project team decided to focus on visitor expenditure in order to provide economic estimates, but even then the paucity of data available meant that estimates could only be crude at best.

There are essentially two methods for measuring visitor expenditure. The first is to survey visitors and enquire about their level of expenditure regarding different items. The second is to census accommodation providers to measure the level of revenue received from customers. The first approach has been employed by Wood (Wood, 2003; Wood & Glasson, 2005; Wood & Hughes, 2006) for estimating visitor expenditure in the Northern Gascoyne. The difficulty with this approach has been in extrapolating expenditure data from the various visitor groups surveyed to the wider visitor population when little is known about the size, structure and characteristics of the broader population. Obtaining a sufficient and reliable sample has also been a challenge in these surveys, due in part to the variety of visitor types, their dispersal over a wide area and their fluctuating numbers both seasonally and from year-to-year.

The second approach is to obtain revenue data from tourism providers. The difficulty with this approach is that businesses are not usually forthcoming with revenue data, and agencies such as the Australian Tax Office tend to protect such data under confidentiality requirements. Fortunately, the ABS has been collecting accommodation revenue data for local areas, and while much of this information is kept confidential, it occasionally releases quarterly data from which overall revenue can be estimated. Such information is also a reasonable source of data on visitor numbers for different visitor segments. However, analysis of such data requires the utilisation of alternative data sources for triangulation. The determination of the economic value of tourism for the Shire of Exmouth by the project team therefore made use of ABS data in combination with other data sources, including Tourism Research Australia (TRA) visitor surveys and DEC camping revenue data.

The place to start for any economic valuation of tourism is to estimate the number of visitors and their particular market segment. As indicated, the information on these aspects for the Shire of Exmouth is relatively poor. It is known that visitation to the Shire of Exmouth is highly seasonal. The peak visitation season is April to October, with April and July being particularly popular months, due to favourable climatic conditions and whale shark migration during this period. The summer months are hot and subject to varying weather patterns, including cyclones. The visitor mix is a diverse one. As an indication of this diversity, the Carnarvon – Ningaloo Coast Site Inventory (DPI, 2003:9) outlines nine visitor types to the Ningaloo coast: independently travelling Australian family groups (kids and parents) on school holidays; groups of Australian fishers; independently travelling elderly Australian caravanners; independent self-drive international travellers; independent young international travellers (i.e. backpackers); international or interstate travellers as part of tour groups; tourists interested in nature and culture-based eco-tourism; locals; and Indigenous traditional owners.

In terms of precise visitor numbers, TRA distributes the National Visitor Survey to randomly selected Australian households and the International Visitor Survey to overseas travellers at international airports that is used as a basis for visitor estimates. It is estimated that 93,800 visitors stayed overnight in the Shire of Exmouth annually between 2004 and 2005 (Tourism Western Australia, 2006), with 19% being interstate visitors, 54% intrastate visitors, and 27% international visitors. Domestic visitors stay on average 6.9 nights, while international visitors stay an average of 4.0 nights. In terms of purpose of visit, 59% of domestic visitors travel to the Shire of Exmouth for holiday or leisure; in contrast, 97% of international visitors travel for holiday or leisure. Modes of transport are shown in Table 1.

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Table 1 Mode of transport for Shire of Exmouth visitors (2004–05 annual average)

Transport	Domestic	International
Private/company vehicle	73%	20%
Rental or hire vehicle	9%	22%
Self-drive 4WD, van, motor-home	-	21%
Air transport	4%	9%
Bus or coach	4%	28%
Other	0%	1%

Source: Tourism Research Australia (NVS and IVS)

Note that these estimates do not include day visitors to Exmouth, nor children under the age of 18 years. Carnarvon, being a major township on the north-south coastal road, would receive a significant number of day visitors travelling along the coastal route. Exmouth, however, is 219 kilometre off the North West Coastal Highway travelling north and 169 kilometre off the highway travelling south (being about a 3.5 hour round trip). Therefore, it receives fewer passers-by, but still may receive a reasonable number of day visitors from those intending to stay in Coral Bay, Carnarvon and Monkey Mia. There are no indicators presently available for estimating the number of day visitors. Therefore, the focus here will be on overnight visitors.

According to the TRA statistics for 2004–05, most overnight visitors to the Shire of Exmouth originate from other parts of Western Australia (approximately 54%), while 19% are interstate visitors, and 27% are international visitors (Tourism Western Australia, 2006). A snapshot indication of visitation to the region is provided in the 2001 Census, which recorded 1994 domestic visitors (including 1721 from Western Australia) and 175 overseas visitors in the Shire of Exmouth—approximately half of the overall population recorded on census night (4265 people). For the Shire of Carnarvon, the census recorded 2,879 domestic visitors (including 2351 from Western Australia) and 211 overseas visitors on 7 August, 2001—approximately one-third of the overall population recorded on census night (9,151 people). While the seasonal pattern of tourism means that the tourist-resident ratio is not so high during the non-peak season, it is nevertheless true to state that visitors make up a significant proportion of the regional population at any one time, firmly underlining the importance of tourism to the region’s economy.

While it can be safely assumed that most visitors to Exmouth visit the Ningaloo Marine Park, this is by no means certain with visitors to the Shire of Carnarvon, given that the township of Carnarvon is located on the major coastal route that bypasses the Ningaloo Marine Park, with the closest point of the Marine Park (the southern tip at Red Bluff) being some 120 kilometres by road and track, and also limited in terms of its access to the extent of the Marine Park (with the coastal track terminating at Gnaraloo Bay). On the other hand, Coral Bay is a major tourism destination, and is immediately adjacent to the Marine Park. Although one estimate puts annual visitation to Coral Bay at 110,000 visitors (Wood & Hughes, 2006:84), there is presently no reliable means for determining what proportion of visitors to the Carnarvon township visit the Ningaloo Marine Park, and there is also no means for disaggregating shire level data for Coral Bay, Red Bluff and Gnaraloo Station from the Carnarvon township. The high degree of uncertainty surrounding the relevance of the Shire of Carnarvon data to the Ningaloo Coast was one of the reasons why the project team chose to focus on the Shire of Exmouth.

Estimates of visitor numbers to the Shire of Exmouth based on TRA survey data for 2004–05 are shown in Table 2.

Table 2 Accommodation for overnight visitors to the Shire of Exmouth (annual average 2004–05)

Accommodation	Domestic visitors	Overseas visitors
Commercial camping	19,500	12,700
Wilderness camping	7,500	
Backpacker hostels		7,600
Hotels, motels and resorts	14,000	4,900
Rented houses/flats	12,500	500
Friends and relatives	4,000	100
Other	3,000	400

Source: Tourism Research Australia

It should be noted that, in contrast to international visitors recorded in the IVS, the annual NVS domestic visitation data used by TRA has a relatively low sample ($N < 50$) for the Shire of Exmouth, with interstate visitors being extremely poorly represented ($N < 10$). Therefore, caution needs to be exercised when interpreting domestic visitor figures. The rolling two-year annual average employed to calculate the figures, however, increases reliability.

The category of wilderness camping combines visitors staying overnight in the Cape Range National Park and those staying on the properties of pastoral stations and unregulated areas (e.g. the bombing range) to the south. Because the camping profile of campers in the National Park differs significantly from other campers (see Chapter 3), it is important to distinguish the visitor patterns characteristic of each location. Because this information is not disaggregated in TRA data, a range of other sources were employed to construct a profile of the various wilderness camping groups.

The number of campers at Cape Range National Park is difficult to estimate. The only reliable figures that are available are those for April 2006, where a count of the camping receipt data by the project team found that 1134 campers stayed for a total of 3695 visitor nights (an average of 3.3 nights per person), and also for July 2006, where 990 campers (891 adults and 99 children) stayed for a total of 4580 visitor nights (an average of 4.7 nights per person). Extrapolating these figures to the entire year is very difficult. The only data source is DEC's set of Cape Range camping revenue, which is unreliable as a monthly count due to the practice of carrying-over revenue to following months, particularly in the off-season months (see Chapter 5). If it is assumed, however, that July monthly revenue is one-seventh of overall revenue (a ratio derived from the camping revenue figures), and that this ratio holds for overall visitor numbers and overall visitor nights as well, then this would equate to approximately 7000 campers (approximately 6300 adults and 700 children) staying for a total of 33,000 visitor nights (30,000 adult visitor nights and 3300 child visitor nights). With camping fees costing \$5 per adult and \$2 per child, this equates to approximately \$156,600 per annum in camping revenue.¹

The DEC aerial surveys indicate that, in the five years between 2002 to 2006, there were an average of 158 groups camping on the Bombing Range, Ningaloo Station, Cardabia Station and Warroora Station in the Easter period of April (note that Gnaraloo Station was not included in the surveys) and 351 groups staying during the school holiday period in July. These two survey dates represent the peak visitation periods. The camper survey carried out in 2006 (see Chapter 3) indicate that pastoral campers in July stayed on average 45 days. Hence, as a rough estimate, it might be speculated that the number of campers censused in the July aerial surveys are approximate to the total number of campers that stayed during that month. With groups conservatively estimated to average four members per travelling party during July

¹ The official CALM camping receipt records show \$172,463 received in 2004–05 and \$179,406 in 2005–06, indicating that the estimates for the different variables are 15% below the recorded total. This might be explained by either a longer average length of stay or, perhaps more likely, a higher number of estimated campers for periods outside July.

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(although the average is probably closer to five members per group; see Chapter Three), this would equate to an average of 1400 campers during July (the same figure estimated by Woods & Hughes, 2006:84). Unfortunately, it is very difficult to surmise the visitor rate for other months as a means for estimating the annual average, but a figure of between 5000 to 7000 campers is probably a reasonable guess. With the DEC aerial surveys indicating that roughly half of wilderness campers south of Cape Range National Park lie within the Exmouth Shire areas of the Bombing Range and Ningaloo Station, it might be reasonable to suggest that between 2500 to 3000 stay in these areas annually. This would bring the number of total wilderness campers in Exmouth Shire (i.e. the National Park and non-designated areas combined) to approximately 10,000 people per annum, which is higher than the 7500 campers indicated in the TRA survey. In terms of estimating financial returns, it should be noted that children under the age of 12 are not charged a fee for camping at Waroora and Cardabia stations, or under the age of 17 at Ningaloo Station. Determining the overall number of children is difficult, but in the 2002–03 survey, it is estimated that approximately 16% of station campers were children under the age of 18 years (see Galloway & Northcote, Appendix B). This would mean that, out of 2500 station campers at Ningaloo station, there are approximately 400 children and 2100 fee-paying adults. With Ningaloo station having a fixed camping fee of \$25 per week per person, this would amount to approximately \$210,000 in annual income (note that Bombing Range campers do not pay fees). These are, admittedly, very general estimates, and future research is necessary to establish more reliable figures.

Visitors staying in commercial caravan and camping parks are the next accommodation group to consider, and for this visitor segment the TRA data and ABS data are sufficient for providing a general visitor profile. Across the four caravan parks in the Shire of Exmouth (with two of the larger parks in the township of Exmouth, and two more in close proximity to Cape Range National Park), there were 146,337 site nights recorded in 2005 bringing in \$3,355,000 in accommodation revenue (ABS, 2006). In 2006, there were 155,569 site nights recorded bringing in \$3,487,000 (ABS, 2007), which was consistent with the previous year. The lack of data on the number of persons staying per site means that it is not possible to independently verify the TRA estimate of 32,200 visitors in commercial camping areas. If the TRA estimate is correct, then using the ABS data it would mean that caravanners and campers in commercial camping areas stay for an average of 4.5 nights in the Shire of Exmouth. Tourism Research Australia's IVS data indicates that 12,750 of these visitors were international visitors that stayed an average of 3.5 nights for a total of 45,350 visitor nights on average.

The only ABS figures available for hostels is for the January to March quarter of 2005 for Exmouth, where 2573 guests stayed for 8640 visitor nights (3.4 nights per person). A total of \$161,224 in accommodation revenue was received (\$18.65 per person per night). There are two backpacker hostels in Exmouth and one in the Shire of Carnarvon officially recorded in the ABS data. However, there are known to be several more hostels in both shires, and so the ABS figures would seem to be grossly underestimated. The IVS data from TRA estimates that approximately 7600 international visitors stayed in backpacker accommodation in Exmouth on average in 2004 and 2005, staying an average of 2.5 nights in 2004 and 3.3 nights in 2005. If we employ the TRA average of 2.9 nights per person in 2004–05 and 22,250 visitor nights, this equates to \$415,000 in accommodation revenue. Note that this does not take into account domestic visitors staying in hostel accommodation, although the number of these visitors is probably quite small.

As for hotel and motel accommodation, the ABS data suppresses most of the quarterly figures due to confidentiality reasons. Only three quarterly figures have been provided since January 2003. The most recent figures, for January to March 2005, reveal 5735 guests among the three main hotel/motel providers that stayed a total of 14,500 visitor nights (an average of 2.5 nights each, and 1.5 persons per room). With the IVS data indicating 4900 international visitors staying in hotels and motels in Exmouth, and the NVS data indicating 14,000 domestic visitors staying in Exmouth hotels and motels, this equates to 18,900 visitors on average per annum in 2004 and 2005. If the ABS average of 2.5 nights per visitor is applied to these figures, then this totals 47,250 visitor nights. Attaching a financial estimate to this is extremely difficult, given that accommodation prices fluctuate according to room type, season and accommodation

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provider. The Shire of Carnarvon—where more quarterly information is available from the ABS—serves as a poor guide for Exmouth pricing, due to less seasonal fluctuations and a more varied clientele (such as visiting workers). It could be assumed, based on a comparison of the ABS accommodation data available for Exmouth shire to the same periods recorded in the ABS figures for the Shire of Carnarvon, that a room in Exmouth costs on average \$15 less than Carnarvon in the peak season (April–September) and \$45 less in the off-season (October–March). Based on the Shire of Carnarvon’s 2004 average accommodation figures, it can be assumed that an average room price in Exmouth for April–September 2004 is \$85 and for October 2004–March 2005 is \$60. If we assume that two-thirds of visitors stay during the peak season, with 1.5 persons per room staying 2.5 nights per stay, then 48,000 visitor nights would equate to \$1.8 million in the peak season ($[32,000 \text{ visitor nights} \div 1.5 \text{ persons per room}] \times \85 per night) and \$640,000 in the off-season ($[16,000 \text{ visitor nights} \div 1.5 \text{ persons per room}] \times \60 per night). This equates to a total of \$2.4 million in accommodation revenue for Exmouth hotels and motels in 2004.

The number of visitors staying in rented houses and apartments is also difficult to estimate. Working on the basis that holiday rental accommodation is approximately \$1000 per week in Exmouth and that an average group size of four persons (the average bed space being 4.5 persons according to ABS statistics for the Gascoyne region in the March quarter 2003 report) stays seven days on average (which is the average length of stay in holiday flats, units and houses according to ABS statistics for the Gascoyne region in the March quarter 2003 report), then 13,000 international and domestic visitors staying in rented houses or apartments according to TRA statistics would equate to \$3.3 million ($[13,000 \text{ visitors} \div 4 \text{ persons per house}] \times \$1000 \text{ per rental per week}$).

The remaining accommodation types are those visitors that stay with friends and relatives (totalling 4100 visitors according to TRA estimates) and those that stay in ‘other’ types of accommodation such as hostels (in the case of domestic visitors), yachts, coaches, cruise ships and the like (totalling 3400 visitors according to TRA estimates). Most of these forms of accommodation either do not involve accommodation expenditure or do not involve expenditure that is received by businesses and residents in the Shire of Exmouth (such as in the case of cruise ships and coaches).

Table 3 shows a summary of estimated accommodation information for different accommodation types in the Shire of Exmouth.

Table 3 Accommodation estimates for the Shire of Exmouth in 2005

Accommodation	Visitors	Stay (average days)	Revenue
Ningaloo pastoral station/RAAF range	3000	45.0	\$210,000
National Park	7000	4.6	\$180,000
SUBTOTAL—open camping	10,000		\$390,000
Commercial camping	32,200	4.5	\$3,355,000
SUBTOTAL—camping	42,200		\$3,745,000
Backpacker/hostel	7,600	2.9	\$415,000
Motels/hotels	18,900	2.5	\$2,400,000
Rental holiday units/houses	13,000	7.0	\$3,300,000
TOTAL	81,700		\$9,860,000

Based on these estimates, visitors that stayed in tourism accommodation or camping areas contributed close to \$10 million in accommodation revenue. Approximately one-third of this revenue was derived from caravanners and campers, one-third from those staying in hostels, motels and hotels, and one-third from those staying in holiday units and houses.

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It is a rather more difficult matter to estimate visitor expenditure on other services, such as tour operators, rental car companies, camping and recreation equipment, grocery stores, restaurants and other businesses that benefit directly or indirectly from tourism, due to the paucity of economic data available. Information from TRA on visitor expenditure is available at the national and state levels, but is extrapolated for the Coral Coast and is not provided for LGAs. Using the Coral Coast estimates, the project team estimated that annual visitor expenditure in the Shire of Exmouth (2004–05) was approximately \$50 million, but this figure could not be further apportioned to the component visitor segments and is, at any rate, a very rough estimate.² In contrast, based on the findings of expenditure surveys, Wood (2003) estimates that visitors contribute \$80 million annually to the local Exmouth economy. This figure, however, is based on an estimated visitation rate of 100,000, and would work out at \$75 million when adjusted for TRA's estimate of 94,000 annual visitors (2004–05). Nevertheless, the discrepancy between the two estimates (\$50 million on the one hand and \$75 million on the other) is enough to warrant some caution in asserting the value of tourism's economic contribution in the region without better data. Hopefully, future research will produce a more reliable estimate regarding tourist expenditure for different visitor segments in the Northern Gascoyne, although methodological issues surrounding the measurement of economic contribution will always plague such estimates for the reasons explained at the start of this section.

Regardless of the precise level of economic contribution brought in by tourism to the region, it is noteworthy that Exmouth residents themselves view tourism as a significant part of the regional economy. Based on Hollett's (2001:71) Exmouth residential survey, respondents estimated an average percentage of 29% of their income was derived from tourism. It is little wonder, then, that Exmouth residents were worried about the economic impacts from expanding the sanctuary zones in Ningaloo Marine Park. However, to truly understand the economic implications of changes to recreational fishing, it is necessary to calculate what contribution is made by recreational fishing to the tourism market and local economy.

The Value of Recreational Fishing

The value of the recreational fishing to the visitor market and to the regional tourism economy in the Northern Gascoyne is one that has not been previously estimated, and one that the project team unfortunately did not possess the time or resources to investigate as comprehensively as it would have liked. It is known that Ningaloo Marine Park holds a special iconic value to long-term locals and visitors alike as a pristine wilderness experience, where camping rough and being self-reliant (including subsistence through cooking caught fish) is an intrinsic aspect of the experience for some. The proposal for the sanctuary zone extensions recognised 'the need to preserve the "Ningaloo experience", a cherished and important part of Western Australian's coastal heritage,' in which 'to catch fish' is a 'major part of this experience' (CALM 2003:10). According to a Department of Fisheries report:

The Gascoyne Region has long been recognised as one of WA's premier quality fishing holiday destinations. The estimated 50,000 fishing tourists who visit the region every year make recreational fishing-based tourism one of the Gascoyne's major industries (1999:i).

While other activities such as whale watching and organised tours are growing in popularity, recreational fishing is still very popular with visitors to the region, particularly domestic visitors.

The 2002 survey of Cape Range visitors (see Polley, Northcote & Moore, Appendix A) indicated that 26.7% of day visitors to the National Park engage in fishing (29.5% of domestic visitors and 10.8% of overseas visitors), as do 59.5% of campers. It is known that Cape Range National Park receives large

² This figure is obtained through the following rationale: TRA data indicates that the Coral Coast received 588,500 domestic visitors @ 5.4 nights @ \$305,000,000, which equals \$96 per night. It also indicates that the Coral Coast received 65,400 international visitors @ 9.0 nights @ \$46,000,000, which equals \$78 per night. It follows that Exmouth, with 68,000 domestic visitors @ 6.9 nights @ \$96/night (from above) equals \$45,000,000, and 25,800 international visitors @ 4.0 nights @ \$78/night (from above) equals \$8,000,000. Total = \$53,000,000.

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numbers of day visitors driving from Exmouth, but it is not known exactly how many. DEC vehicle counts put the number of visitors entering the National Park on average in 2004–2005 as 150,000, but this total does not take into account tourists undertaking multiple visits to the National Park and is therefore not a measure of individual visitors, which could not be expected to be above the general estimate of visitors to the Shire of Exmouth (i.e. 93,000 visitors).³ Tourists staying in Exmouth, for example, may visit the National Park several times during their visit, and Exmouth residents may visit the National Park many more times during the course of one year. Polley, Northcote and Moore (see Appendix A) estimate that visitors entered the National Park on average 1.7 times each year, with no discernible differences between campers and day visitors. Although the project team admits that the figure is a crude estimate, if we take 1.7 visits as generalisable to other months, this would put the number of people who visit the National Park at approximately 88,000, which is marginally below the TRA estimate for total number of visitors to the Shire of Exmouth. This is certainly realistic, given the position of the Marine Park and National Park as the Shire of Exmouth's prime tourist attractions.

If it is accepted that one-quarter of visitors engage in fishing in the National Park (based on the 2002 survey), then it can be estimated that approximately 22,000 people undertook recreational fishing in the National Park annually between 2004–05. With abundant scope for fishing activity in the Marine Park north and south of Cape Range National Park, it can be expected that the annual number of people fishing in the Marine Park is considerably higher than this.

The best measure for overall recreational fishing visitors in the Shire of Exmouth is provided by TRA's visitor surveys. Again, low sample numbers plague the reliability of the data for domestic visitors. For this reason, a five year average has been employed for the following estimates for visitor activities (except for snorkelling, where a three-year average has been employed due to this activity not being recorded prior to 2003). The total frequency of agreements are shown in Table 4 against the total sample (i.e. the number of people that indicated they visited the Shire of Exmouth within the three-month period prior to the quarterly administered national survey). The percentage refers to the proportion of the total frequency to the total sample. The estimate is derived by taking the proportion of the total Shire of Exmouth sample to the national sample, and also taking the proportion of the national sample to the total national residential population, and multiplying the total frequency by both these figures. Because the samples fluctuate from quarter to quarter, these figures are not shown in Table 4.

Table 4 Domestic visitor activities to the Shire of Exmouth (five year average, 2001–2005)

Activity	Total frequency	Total sample	Percentage	Estimate
Fishing	87	217	40.1%	27,600
Going to the beach	101	217	46.5%	32,200
*Snorkelling	38	140	27.1%	20,300
Eating at restaurants	85	217	39.2%	25,200
General sightseeing	82	217	37.8%	26,800

* from 2003 onwards

Source: TRA (Domestic Visitor Survey)

In terms of outdoor activities, the most popular activity for domestic visitors is going to the beach (which includes swimming), followed by fishing, general sightseeing and snorkelling.

The figures for international visitors, shown in Table 5, involve a more robust sample, but a five-year average has been employed for most international visitor activities in order to match with domestic figures.

³ It also does not take into account the minority of visitors that enter the National Park from the south.

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Table 5 International visitor activities to the Shire of Exmouth (five year average, 2001–2005)

Activity	Total frequency	Total sample	Percentage	Estimate
Fishing	141	810	17.4%	4,500
Going to the beach	689	810	85.1%	23,200
Whale or dolphin watching	516	810	63.7%	16,400
**Snorkelling	352	489	72.0%	18,300
*Scuba diving	171	638	26.8%	6,800
Guided tours	475	810	58.6%	16,300
**Charter boat or cruises	275	489	56.2%	45,300

* from 2002 onwards

** from 2003 onwards

Source: TRA (International Visitor Survey)

Note that the figures for international visitors refer to activities undertaken during their Australian stay, and not necessarily during their visit to the Shire of Exmouth. At any rate, it is clear that fishing is not particularly popular among international visitors. Going to the beach is most popular (which includes swimming, surfing and diving), followed by snorkelling and scuba diving. Presuming that most of these activities are undertaken during their visit to the Shire of Exmouth, it would mean that overall, snorkelling is the second most popular outdoor activity for visitors (both international and domestic) in the Shire of Exmouth after swimming, with fishing third and whale watching fourth. However, general sightseeing is not an activity covered in the IVS, and would likely outrank snorkelling and probably even swimming as the most popular outdoor activity.

Based on TRA’s survey data, then, it is reasonable to estimate that the Shire of Exmouth attracts approximately 30,000 fishing overnight visitors each year, being approximately one-third of all visitors. With an untold number of fishing visitors travelling in the companionship of partners, children and friends, the importance of recreational fishing to tourism in the region begins to take on profound proportions.

It is not possible to estimate the number of visitors that engage in boat fishing as opposed to shore-based fishing (the latter activity being relatively unaffected by changes to the sanctuary zones). Based on the 2002 survey of Cape Range day visitors, it might be estimated that approximately 5% of visitors engage in boat fishing in Cape Range National Park (Appendix A), which would equate to approximately 4400 people. This figure, however, is a very crude estimate. Small boats can be launched from 4 to 5 locations within Cape Range National Park (CALM, 2004:15). It is likely, however, that many more visitors staying in Exmouth enter their boats at public ramps to the north of Cape Range National Park, with public boat ramps located at Bundegi near North West Cape just north of Exmouth (from where charter boats depart), at Exmouth Boat Harbour just south of Exmouth, and Tantabiddi just north of the National Park. Boats can also be launched from beaches at several locations to the south of the National Park, where boat fishing is particularly popular (see Chapter 2).

At the time of the study, a boat ramp facility had been commissioned for Coral Bay to replace beach launches from southern Bills Bay. Although Coral Bay was not included in the main study area for the impact assessment (partly due to the lack of visitor data disaggregated from Carnarvon, but also due to low-level change from sanctuary zone expansion, with the addition of Bateman Sanctuary Zone being relatively minor), the results of a 2005–06 recreational boating survey (Worley Parsons Services, 2006:11) provide some interesting information worth highlighting. The survey, which was carried out periodically over a 12-month period, found that 73% of boaters engaged in recreational fishing, while 16% undertook diving/snorkelling, and 11% other activities (including fishing for squid, general cruising and research). Boating trips involving recreational fishing were significantly longer in duration than trips involving other

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activities (Table 6), which the project team speculates might be related to the intensive nature of diving and snorkelling activities and the locations visited.

Table 6 Length of time boating per activity (Coral Bay)

	Less than 2 hrs	2-4 hrs	4-6 hrs	More than 6 hrs
Fishing	34%	70%	79%	88%
Diving/snorkelling	40%	18%	9%	2%
Other	26%	12%	11%	9%

Source: Ningaloo Sustainable Development Office

The proportion of boats in different size classes based on activity is shown below in Table 7.

Table 7 Size of boat per activity (Coral Bay)

	Less than 4m	4-6m	6-8m	More than 8m
Fishing	66%	77%	89%	100%
Diving/snorkelling	23%	14%	7%	0%
Other	11%	9%	4%	0%

Source: Ningaloo Sustainable Development Office

In total, it was found that 23% of boats were under four metres in size, 61% were between four to six metres, 16% were between six to eight metres, and less than 1% was over eight metres. The average size of boats launched from the boat ramp at Coral Bay is considerably larger than those launched from beaches in the pastoral stations to the north and south of Coral Bay, where a 2002 survey found that 67% were under four metres, 28% between four to six metres, 4.7% between six to eight metres, and no boats were recorded over eight metres (Galloway & Northcote, Appendix B).

One interesting finding from the Coral Bay boating study is that while 71% of boaters stayed in Coral Bay caravan parks, 20% stayed in rental accommodation—again pointing to the need to understand more about the importance of rental accommodation in regional tourism. The remaining 9% of boaters either stayed at the resort (5%) or else the hostel, the research station, with friends or relatives, or were day visitors (Worley Parsons Services, 2006:24). This suggests that most boaters in more remote locations in the Northern Gascoyne, including the Shire of Exmouth, are unlikely to be day visitors. Another interesting finding is that 97% of boaters originated from within Western Australia, with half from regional areas and half from metropolitan Perth (Worley Parsons Services, 2006:25). Unfortunately, the Coral Bay boating study does not provide any estimates for the annual number of boaters.

Additionally, there are visitors who use charter-boats for offshore fishing, which have access to all areas of the Marine Park (with the exception of the sanctuary zones in the case of fishing expeditions). Data provided by the Department of Fisheries (Table 8) reveals that of 86% logs provided by Exmouth charter boat operators with activity information, close to one-third (31.6%) of clients engaged in fishing-only tours.

Table 8 Annual average of charter boat clients (2002–2005)

	Fishing only*	Total clients*	Proportion of all clients	Fishing-only in Ningaloo*	Proportion of all fishing only clients
Exmouth	928	2931	31.6%	166	17.9%
Coral Bay	2728	8259	33.0%	280	10.3%

Note: percentages are derived from raw figures provided by the Department of Fisheries (indicated by *).

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There was an almost identical proportion to Coral Bay charter tours, where, of the 82% complete logs, 33.0% of clients engaged in fishing-only tours. However, since 2002, only between 8–25% of fishing-only charter boat clients on tours from Exmouth did so from within, or in close proximity to, the State waters of the Marine Park. This zone is defined by the area shaded in, which corresponds to grid areas with at least 70% of their area within State waters of the Marine Park (see Figure 4).

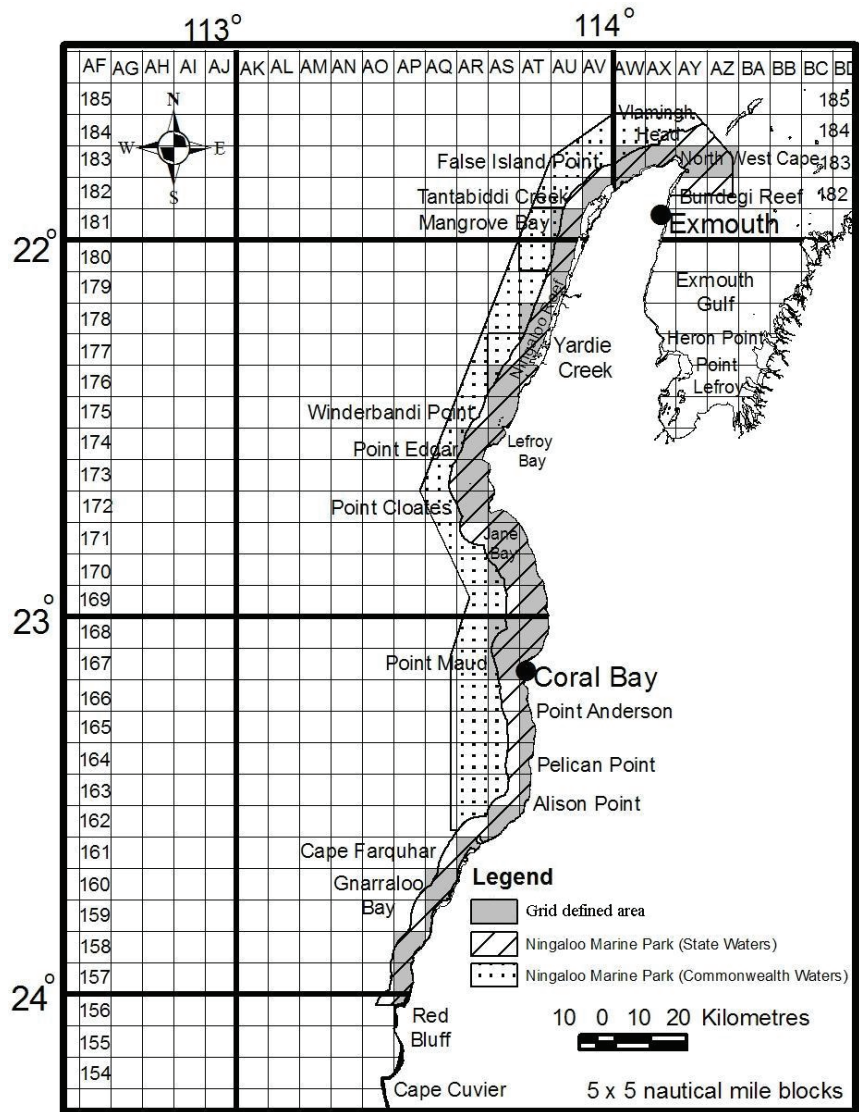


Figure 4 Grid area defined for reef charter boat activity

Source: DoF 2006

For Coral Bay fishing-only charter boat clients, the proportion was even less (between 7–14%). It can be concluded that most recreational fishing in charter boats takes place further out to sea away from the reef. Note that charter boats from other departure points, such as Carnarvon, may also visit the Ningaloo coast. However, it is clear that we are dealing with a relatively low number of recreational fishers employing charter boats when compared with the wider visitor market.

More research is needed on annual numbers of boat-based and shore-based fishers. At any rate, knowing how many people engage in recreational fishing (whether from boat or from shore) does not tell

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us to what degree visitors value recreational fishing as an essential part of their holiday experience. In a combined sample from surveys carried out between the township of Exmouth, Cape Range National Park and Learmonth Airport between 2000 and 2002, Wood (2003) found that 34% of visitors participated in recreational fishing, but it was the preferred activity for only 10%. One problem with attributing a value to fishing based on a prioritisation of activities is that it does not necessarily mean that the preferred activity is instrumental to their choice of destination. The real value of an activity can only be determined by assessing whether visitors would choose to still travel to a destination if that activity could not be undertaken.

One way to determine such a matter is to ask visitors directly if they would come or return to the destination if they could not pursue a particularly activity (in this instance, fishing). This was the approach employed by Wilson and Tisdell (2001) in assessing the value of sea turtle viewing in Bundaberg, and also by Smith, Newsome, Lee and Stoeckle (2005) in assessing the value of dolphin viewing for visitors to Shark Bay. While the hypothetical nature of this line of questioning can cast doubt over the validity of the results, it is probably the best means available for determining the social and economic value of a particular activity to a destination. It must be kept in mind, however, that the specific management changes being assessed in this report do not rule out recreational fishing altogether and mostly apply to boat fishing, and so the matter is essentially one of degrees of restriction to a particular form of recreational fishing (that is, boat fishing), not its total absence. At any rate, given sensitivities of residents and wilderness campers to the whole matter of restrictions at the time of the assessment, it was not felt appropriate to administer a survey that postulated scenarios involving total restrictions on recreational fishing. However, this is certainly an issue worth taking up in future visitor surveys, particularly surveys that cover all visitor segments and inquire about a range of activities.

In order to get some idea of the value placed on recreational fishing at Ningaloo, the project team settled on the method of asking respondents to what extent they valued fishing as important to the enjoyment of their visit. The results, discussed in detail in the next chapter, established that the value that pastoral station campers placed on fishing is very high, with 60% rating it as being extremely important for enjoyment of their visit. These findings are considerably higher than Cape Range campers (31.8%), and presumably other visitor groups. However, it is also suggested that a combination of activities contribute to visitor satisfaction. For many visitors, coming to Ningaloo would seem to be part of an overall 'wilderness experience' that cannot be readily broken down into its constituent parts—even though some parts may hold more value than others. For those who visit the region regularly, the issue is really at what point does the wilderness experience depart from what they hold to be ideal that they do not wish to visit the destination again. On this matter, the project team were unable to arrive at a determination, and therefore could not provide an indicative value of recreational fishing for visitors to the Ningaloo coast.

It must be kept in mind that there is an important distinction between fishing visitors that visit Ningaloo as their preferred destination, and those that visit Ningaloo as part of a multi-destination tour of Australia. The former tends to visit Ningaloo on the basis that the area fulfils (or is expected to fulfil) their activity preferences, and may choose to visit elsewhere if these preferences are not fulfilled. The single destination travellers tend to be intrastate visitors and mostly repeat visitors. Tourers, on the other hand, will probably visit Ningaloo regardless. These multi-destination travellers tend to be interstate or international visitors, and visit the area only once (see Polley, Northcote & Moore, Appendix A). It is among intrastate visitors, then, that we would expect to find the highest propensity to change their destination preferences in the face of increasing fishing restrictions.

Conclusion

The natural attractions of the Ningaloo coast attracted approximately 94,000 tourists in 2004–05 to the Shire of Exmouth (Tourism Western Australia, 2006) and garnered an estimated \$50 million in tourism revenue, including at least \$10 million in accommodation revenue. These figures, however, are rough estimates. Estimating the economic contribution of recreational fishing is even more problematic, due to the

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poor quality of data available. The only option left for the project team was to ascertain whether tourism had declined as a result of the changes, and hence infer whether the economic contribution (whatever this might be) had been adversely affected, without attaching a substantive value to this. Given that baseline measures for overall visitor rates from TRA survey data were themselves questionable and open to a variety of interpretations concerning the causes of fluctuations from year-to-year (see Chapter 4 and Appendix C), the project team decided to undertake a survey of one visitor market segment—wilderness campers—to determine whether this group had been adversely affected by the expanded sanctuary zones based on their own subjective assessment of the matter. Because wilderness campers are renowned for being avid fishers, it was felt by the project team that an assessment of the impacts on this group might serve as a useful ‘litmus test’ for assessing impacts on other recreational fishers, although the validity of this assumption remains untested. At the very least, it was felt that an examination of this group would make an interesting case study for understanding behavioural and attitudinal responses to sanctuary zone changes, thereby shedding light on the types of factors and issues involved.

Chapter 3

2006 NINGALOO COASTAL CAMPER SURVEY

Introduction

In the minds of planning authorities, the extension of the sanctuary zones was expected to be minimally disruptive to shore-based recreational fishers (whose access was generally maintained), with the feeling that there were many alternative areas available for those wishing to fish from boats. The question is, were the changes as innocuous as the planners had hoped? One means for answering this question was to ask visitors and residents themselves to comment about the impacts of the sanctuary zone changes in the short-term.

There are several reasons why the project team chose to focus on pastoral station wilderness campers for assessing the short-term impact of the expanded sanctuary zones on visitor behaviour. First, wilderness campers are the most extensively studied visitor segment in the Ningaloo region and have the best baseline data available. Second, they are the group that would be expected to be most sensitive to changes to sanctuary zone boundaries, given that they are known to place a high value on the Ningaloo wilderness experience as a key element of their visit to the region, with fishing being a primary part of that experience. Their place of accommodation is in most cases in areas with close proximity to the sanctuary zones – chosen because of the value they place on recreational fishing. They are the visitor group, therefore, that potentially provides the best source of information regarding the social impacts surrounding sanctuary zone expansion. Second, among the visiting groups, these wilderness campers are the ones who have seemingly made the Ningaloo Coast the prime destination of their annual holiday visits, with most being long-term repeat visitors. In contrast, the 2002 survey of Cape Range visitors found that almost three-quarters of day visitors had not visited the National Park before (Polley, Northcote & Moore, Appendix A). Repeat visitors and first-time visitors pose different issues with respect to increased limits on fishing activity, given that the former is more prone to feeling the loss of traditional fishing spots and making future visitation decisions based on their holiday experiences, in contrast to the latter group which is more influenced by market information about the destination prior to travel. Finally, wilderness campers are less subject to the confounding factors of accommodation pricing and destination marketing that cause fluctuations in the numbers of other holiday-makers, therefore making them easier to study from a monitoring point of view.

On the negative side, the sense of attachment to the area by long-term campers and ideological opposition to external regulation meant that they were perhaps more susceptible to being influenced by the politics surrounding the management plan, and so an element of bias might be expected to enter into some of their responses. Also, the pastoral station campers are the tourism group that has the least economic impact on the regional economy due to their relatively small numbers (Wood, 2003). With respect to the first concern, the project team has no specific means for judging the degree of bias in responses, but does note that campers were able to provide specific details about the nature of impacts that were well supported by independent data. With respect to the second concern, it should be noted that if Wood's (2003) average daily expenditure figures are accepted (and as mentioned earlier, these figures need to be interpreted cautiously), pastoral station campers spend more per person during their stay in the region than any other visitor group due to their much longer length of stay, spending on average \$2,385 per person per visit (about three times more than those staying in Exmouth and ten times more than Cape Range campers). Additionally, most station campers visit the region annually, and therefore their economic contribution to the area is impressive over the long-term. It is only due to their relatively low numbers that their overall economic contribution as a visitor segment is considered low. However, with many of the station campers undoubtedly spending large sums of money on purchasing, maintaining and equipping their 4WD vehicles, boats, caravans, and camping equipment, their economic contribution to their place of residence (Perth for

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most of them) should also not be forgotten, even though this is not the interest of the current report (for an indication of expenditure costs associated with recreational fishing both home and away, see Henry & Lyle, 2003).

There is no doubt that the pastoral station campers are keen fishers. Previous surveys conducted by Galloway (see Appendix B) and Wood (2003) have shown that campers along the Ningaloo Coast are passionate about recreational fishing, although different approaches to measuring attachment have resulted in different results. For example, Galloway's survey of station campers asked respondents what value they place on fishing, while Wood's survey (2003:12) asked campers if fishing was their preferred activity. Wood found that 50% of campers on stations nominated fishing as their preferred activity, while Galloway found among the same campers (surveyed in the same month) that 60% regarded fishing as extremely important to the enjoyment of their visit while a further 20% viewed it as quite important. These results are not necessarily inconsistent—the questions were posed in different ways, and given that campers might rate two or three activities as intrinsic to their holiday experience, the difference between the two results is readily explained by some campers rating activities other than fishing as slightly higher in Wood's survey. It underscores the point that statements regarding the popularity of fishing as an activity need to be carefully qualified.

These issues must be kept in mind when analysing the responses of wilderness campers to questions about their visitation to the Ningaloo coast. The project team initiated a survey (Appendix D) to find out more about the characteristics of pastoral stations campers and the impacts of the sanctuary zone changes on their activities. This survey was carried out in July 2006, some one-and-a-half years after the new management plan was approved, and ten months after legislation enforcing the extended sanctuary zone restrictions was introduced.

Methodology

The survey was administered across three regions along the Ningaloo coast—Warroora Station, Ningaloo Station and Cape Range National Park. Camping hosts at the respective locations administered the survey to campers. A total of 358 campers responded to the survey, with 59 respondents from Cape Range, 223 campers from Ningaloo station and 76 campers from Warroora Station. Ningaloo Station campers were surveyed over a seven-day period between July 15 to 21. Warroora Station campers were surveyed over a five-day period between July 16 to 20. Cape Range campers were surveyed over a much longer period between July 9 and August 8, with 59 campers participating in the survey. It is estimated that most—if not all—station campers at Warroora and Ningaloo stations were surveyed during their survey periods, and hence may represent something of a census of campers (although the project team was unable to verify this). Cape Range respondents, on the other hand, represent a small sample of the overall number of campers who stayed during this period, and the reliability of the results for these campers is therefore questionable.

A major issue with surveying in the Northern Gascoyne is the significant differences between visitor segments in terms of factors such as origin, length of stay, preferred activities and other demographic and visitation factors. A survey of pastoral station campers will produce somewhat different results from a survey of Cape Range campers, which will produce different results from a survey of day-use visitors. The same applies to those staying at commercial caravan and camping parks, backpacker hostels, and other visitor segments. Researchers have to be very careful in their sampling and analysis, particularly when aggregating the results of respondents from different locations, to ensure that certain visitor segments are not overrepresented in the results—a problem that has plagued past surveys in the region.

Results

Visitor characteristics

Almost two thirds (64.4%) of Cape Range campers were first-time visitors to the region, which generally agrees with the findings of the 2002 survey of Cape Range campers by Polley, Northcote and Moore (Appendix A). In contrast, 91.4% of Ningaloo campers were repeat visitors, as were 89.5% of Warroora campers. This figure for repeat visitation is higher than what was reported in the 2002–03 survey of station campers by Galloway and Northcote (Appendix B), where 80.6% of station campers had previously visited the region. Cape Range campers had visited an average of 4.7 times (SD = 6.2) with a median of 1 visit, while Ningaloo campers had visited an average of 10.6 times (SD = 10.3) with a median of 7 visits, and Warroora campers an average of 10 times (SD = 13.8) with a median of 5 visits. Hence, the station campers were more long-term visitors than the Cape Range campers.

As shown in Table 9, the vast majority of campers on the stations are intrastate visitors, with relatively few interstate visitors and no international visitors. Cape Range, on the other hand, has a significant proportion of campers from interstate and overseas.

Table 9 Origins of campers

Camp	intrastate	interstate	international
Cape Range (N = 40)	46.6%	31.0%	22.4%
Ningaloo (N = 174)	94.2%	5.8%	0%
Warroora (N = 66)	90.8%	9.2%	0%

In terms of length of stay, those staying at Cape Range camped for an average of 13.4 days (SD = 10.4) for a median stay of eight days. However, the small sample for these campers makes this result uncertain, particularly in light of the camping receipt data (see Chapter 4) which confirms that the average length of stay in July 2006 was 4.6 nights per person. Those at Ningaloo station camped for an average of 48.5 days (SD = 53.3) at a median of 19 days, and those at Warroora camped for an average of 43.4 days (SD = 39.5) at a median of 21 days. The overall average length of stay of 47 days (SD = 50.1) is identical to the findings of a 2002 survey conducted by Remote Research (2002), and similar to the findings of a 2002–03 survey (Galloway & Northcote, Appendix B), which estimated the average length of stay to be 44 days.

Cape Range campers averaged 2.2 persons in their travelling groups (SD = 0.77), with a median of two, while those at Ningaloo station had an average of 5.5 members in their group (SD = 4.7) with a median of four, and those at Warroora station had an average of 4.16 (SD = 3.8) with a median of two people.

Activities

As shown in Table 10, recreational fishing dominated the activities engaged in by wilderness campers staying on pastoral station properties.

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Table 10 Activities participated in during stay

Activity	Cape Range	Ningaloo	Warroora
Swimming	89.8%	84.8%	84.2%
Snorkelling	74.6%	64.1%	48.7%
Scuba diving	5.1%	7.2%	7.9%
Fishing	57.6%	90.6%	89.5%
(Shore fishing)	54.2%	61.4%	73.7%
(Boat fishing)	20.3%	74.0%	72.4%
Canoeing/kayaking	3.4%	26.6%	7.9%
Boating	15.3%	61.4%	36.8%
Walking/hiking	94.9%	78.5%	86.8%
Picnicking	49.2%	35.9%	32.9%
4WDing	16.9%	45.7%	36.8%
Viewing wildlife	72.9%	70.0%	60.5%
Tour	15.3%	0%	1.3%
Surfing/windsurfing	10.2%	0%	1.3%
Other	16.9%	0%	1.3%

The 57.6% of Cape Range campers who engage in fishing is more or less consistent with the 59.5% recorded by Polley, Northcote and Moore in the 2002 survey (Appendix A). As shown in Table 11, 66.5% of campers at Ningaloo Station valued fishing as extremely important to the enjoyment of their visit, with 44.7% of campers at Warroora Station answering the same, compared with 31.9% of Cape Range campers. Interestingly, boat fishing is more popular than shore fishing at Ningaloo Station, while the reverse is true for Cape Range National Park. Campers at Warroora participated in both types of fishing equally.

Table 11 Importance of fishing to the enjoyment of their visit

Camp	Not important	Of little importance	Neutral	Of some importance	Extremely important
Cape Range	27.6%	5.2%	10.3%	24.1%	32.8%
Ningaloo	1.4%	0.5%	3.6%	28.1%	66.5%
Warroora	5.3%	2.6%	2.6%	44.7%	44.7%

Altogether, 60.4% of the station campers (Ningaloo and Warroora combined) rated fishing as extremely important, which is precisely the same amount (60.4%) reported by Galloway and Northcote in 2002–03 (see Appendix B). This suggests that the rate of participation in fishing, and the importance attached to it, has remained unchanged since 2002.

The variety of activities that campers participate in is another important point to emphasise in these findings. While fishing is the most prevalent activity among Warroora and Ningaloo station campers, swimming and walking/hiking are not far behind, with snorkelling, wildlife viewing, boating, picnicking and 4WDing also popular. While only one quarter (22%) of Cape Range campers brought a boat with them, 68% of Ningaloo station campers and 61.8% of Warroora campers did so. The fact that participation of

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campers in boat fishing is slightly higher than possessing a boat probably reflects the fact that some campers jointly use boats belonging to other groups.

Sanctuary zones

In terms of awareness of the sanctuary zone expansion, less than half (46.8%) of Cape Range campers were aware of the changes, in contrast to 80.8% of the pastoral station campers. This is mostly explained by the greater proportion of Cape Range campers who were first-time visitors, with there being a strong association between being unaware of the sanctuary zones changes and not having visited the area before ($\chi^2 = 21.5$, $N = 58$, $p < 0.01$).

As expected, the majority of pastoral station campers disapproved of the sanctuary zone changes, as shown in Table 12. However, there were some interesting variations between camping areas.

Table 12 Opinion regarding sanctuary zone expansion

Camping area	Opposed	Neutral	Supportive
Cape Range	10.2%	30.8%	57.7%
Ningaloo	79.6%	13.0%	7.4%
Warroora	45.9%	17.6%	36.5%

For those who had visited the area prior to December 2004 ($N = 287$), those at Ningaloo station—the area most affected by changes to the sanctuary zones—indicated the highest level of change to their activities, shown in Table 13.

Table 13 Impact of sanctuary zone extensions on activities

Camping area	No change	Some change	Much change	Unsure
Cape Range	75.0%	8.3%	4.2%	12.5%
Ningaloo	17.4%	23.4%	56.7%	2.5%
Warroora	38.5%	38.5%	20.0%	3.1%

In total, 80.1% of Ningaloo campers expressed some level of change in their activities as a result of the sanctuary zone expansion, in contrast to 58.5% of Warroora campers.

Not surprisingly, there was a significant association among pastoral station campers between being opposed to the sanctuary zones and believing one's activities to be affected by them ($\chi^2 = 64.6$, $N = 272$, $p < 0.01$). Of those who noted a change in their activities, 83.5% were opposed to the sanctuary zones, 9% were neutral and 7.5% were supportive. In the case of Ningaloo station campers, the same number of respondents were opposed to the sanctuary zones (80%) as felt affected by them in terms of changes to their activities (80%). This raises the question of whether ideological factors (i.e. opposition to sanctuary zones in principle) led respondents to exaggerate the effects of the sanctuary zones, or whether opposition rose out of (or was reinforced by) actual experiences of impacts. There is no way, unfortunately, of disentangling attitudes from experiences—probably not even in the minds of respondents themselves. However, given the similar visitor profile of Ningaloo and Warroora station campers, it is noteworthy that it is the former group—the group that was in the area of the most extensive changes—which reported the greatest disruption to their activities, and this does suggest that experience of actual impacts did play a pivotal role in the way they framed their responses to this question.

Respondents that indicated a change in their activities were given the opportunity to provide a brief statement on the nature of the changes experienced. The majority reported changes in boating or camping

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behaviour related to boat fishing. Although respondents did not specify their precise camping location, it would seem that those continuing to camp adjacent to newly created sanctuary zones, such as between Bruboodjoo Point and Point Edgar (including Jane Bay and Norwegian Bay), and also north of Winderabandi Point to Sandy Point, were those who were most affected. Several respondents reported that they were no longer setting out in their boats, leading some to complain that their fishing experience had been compromised, with some complaining that they could no longer catch squid. Others, however, were setting out in their boats for nearby recreation zones or to general use zones outside the reef, but complained about being inconvenienced by boating the extra distance to these areas, including the extra costs involved for fuel. Those setting out for nearby recreation zones complained about the crowding in these zones, with some pointing out that the concentration of boats in a confined area presented a safety hazard. Several of those setting out beyond the reef in small boats complained that there was increased danger due to their exposure to waves and uncertain weather conditions. Some pointed out that their children could no longer engage in boat fishing because of the distances involved and the safety problems. Finally, others indicated that they had moved camp to areas adjacent to recreation zones (presumably Lefroy Bay), with some complaining about not being able to camp at their normal sites and experiencing crowding in their new camping areas. Unfortunately, specific camping location data for Ningaloo station was not provided (keeping in mind that the pastoral leases cover an extensive stretch of coastline) in order to correlate with responses regarding impacts, while camping location data for Warroora station was inconclusive due to small sample sizes. Hence, more research is needed to verify the extent of localised shifts of boating and camping and the factors underlying such shifts.

Respondents were asked to indicate what maximum level of sanctuary zone coverage of the Ningaloo Marine Park they would be willing to accept. They were required to provide a percentage figure, and the responses were reclassified according to whether they were above, below or at present levels (note that ‘present levels’ refers to a range of between 28% to 38% of the Marine Park, to allow for some uncertainty in estimates of the current sanctuary zone area among campers). The responses are shown in Table 14.

Table 14 Sanctuary zone tolerance

Camping area	Present level too great	Present level acceptable	Present level too little
Cape Range	2.5%	75.0%	22.5%
Ningaloo	70.1%	28.2%	1.7%
Warroora	30.3%	62.1%	7.6%

Most Ningaloo station campers (70.1%) indicated that the current size of the sanctuary zones exceeded their maximum level of acceptance. Most Warroora station campers, on the other hand, indicated that current levels were within their limits of acceptability, as did Cape Range campers. Only a minority of respondents from all three areas were willing to entertain an increase in sanctuary zone coverage. However, it is worthwhile to note that with these types of questions respondents may tend to conform to the status quo (Stewart & Cole, 2003) or ‘anchor’ their judgements according to prevailing conditions (Moore & Polley, 2007), which implies that responses may change as the prevailing situation changes. While this might be the case, it is clear that many Ningaloo station campers felt compelled to dispute the status quo and/or prevailing conditions, indicating that the changed conditions had not yet become normalised in their outlook. It may be simply that for these campers not enough time had passed for the previous status quo (i.e. when the sanctuary zones covered 10% of the Marine Park) to be erased from their collective memory—a transformation that is likely to be much slower in the case of long-term repeat visitors with a high degree of sentimental attachment to destinations. Only time will tell if the new management regulations become the status quo and/or the prevailing conditions with which station campers anchor their judgements. Much of this will depend, of course, on how well campers adapt to prevailing conditions, such that their overall visitation experience is not significantly degraded in the long-term. This leads us to the matter of visitor satisfaction.

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Despite the majority of station campers feeling affected by the changes to the sanctuary zones, most campers rated the quality of their ‘camping experience’ highly, with 98.2% of Ningaloo campers and 94.8% of Warroora campers rating their stay as good or excellent (see Table 15).

Table 15 Quality of camping experience

Camping area	Average	Good	Excellent
Cape Range	3.4%	29.3%	67.2%
Ningaloo	1.8%	33.0%	65.2%
Warroora	5.3%	22.4%	72.4%

Because there is no baseline measure of visitor satisfaction with which to compare these results, it is not possible to determine whether visitation satisfaction has increased or decreased since the expansion of the sanctuary zones. However, one interesting finding is that 99.1% of Ningaloo station campers and 100% of Warroora station campers indicated that they intended to visit the area again in the future. This compares to the 2002–03 survey of station campers (Galloway & Northcote, Appendix B) that found 91.7% of respondents intended to return to the area, indicating an actual increase in attachment to the area.

Conclusion

The survey results indicate that station campers in the areas most affected by changes to the sanctuary zones—namely, campers at Ningaloo station—felt most impacted by the changes, which has altered the boating and camping behaviour of at least half of respondents substantially and approximately another quarter to some extent. While it is possible that respondents were prone to exaggerating the effects because of opposition to the sanctuary zone decision, it must be said that in most cases they were able to offer specific reasons for their inconvenience. It would appear to be the case that the changes had led to a concentration of boats in the recreation zones and a higher concentration of campers at favourable sites near those zones, with those located in areas adjacent to sanctuary zones experiencing the added difficulty of boating long distances to these areas or outside the reef. Given that most campers launch small boats, with two thirds of station campers’ boats being less than four meters according to the 2002–03 survey (Galloway & Northcote, Appendix B), it can be seen that they are particularly susceptible to weather conditions outside the reef, and so are more restricted in their movement. In this sense, the expansion of the sanctuary zones has led to a localised change of conditions and/or behaviour among many camping visitors.

The manner in which these changes impacted on the overall satisfaction of their stay, however, was minimal. This can largely be attributed to the fact that boat fishing was still possible in the reef, and also due to the wide range of activities that campers engage in during their stay, with the overall ‘wilderness experience’ being maintained despite increased restrictions on boat fishing. This is not to say, however, that their visitor experience would not be severely diminished—perhaps to the point of not wishing to return to the area in the future—if fishing was not possible at Ningaloo (the mere fact that fishing is rated by 60% of station campers as extremely important to their visit would tend to support this). It may well be the case that fishing is part of a constellation of three to four activities (the other activities being camping, boating and swimming) that campers require in order to make their visit worthwhile. Excessive restrictions on any one of these activities may well be enough for them to seek out alternative destinations for their travels. For this reason, it is important to carefully monitor the visitation patterns and satisfaction levels of wilderness campers to ensure that future management decisions are aligned with their interests—balanced, of course, with the need to protect the marine and terrestrial environment.

Chapter 4

SHIRE OF EXMOUTH RESIDENT SURVEY⁴

Introduction

The Shire of Exmouth is home to 2231 people (ABS 2001 Census). Hollett's (2001:72) survey of Exmouth residents found that 37.6% of residents moved to the area primarily for the climate, 34% for the lifestyle, 20.6% for family and friends, 12.8% for the natural environment, and 12.1% for security/safety. The absence of 'employment' as a category here is odd, given that according to a 1999 survey of Gascoyne residents (Patterson Market Research, 1999) most respondents (45%) indicated that they move to the region primarily for employment reasons. Interestingly, the 1999 survey found that only 12% of Gascoyne residents would choose to stay in the region if they had a choice, which was equal lowest with the Pilbara in all the state regions surveyed. Very few Western Australians in regional areas would choose to move to the Gascoyne (around 1%), but it was found that among those who would, 34% would do so for its fishing, which was the third most commonly cited reason after climate (53%) and lifestyle (37%). It is probably the case that these three factors are highly interrelated when understanding Exmouth residents' concerns about expansion of the sanctuary zones. It was a fear that the lifestyle of residents would be threatened by changes to the sanctuary zones, particularly fishing activities, that seemingly contributed to some community opposition to expansion of the sanctuary zones in 2004. Other issues that emerged during the debate were fears of detrimental impacts on the local economy from a loss of tourism, resentment at external intervention in the affairs of the local area, and dissatisfaction with the consultation process that was carried out with community representatives. It is against this background that residents of the Shire of Exmouth were asked to comment about impacts from sanctuary zone changes in September–October 2005. The project team incorporated a number of questions into a survey carried out by Colin Ingram for a Masters research project examining residents' views on DEC's management of Ningaloo Marine Park and Cape Range National Park (see Appendix E).

Method

A random sample of 708 residents from the Shire of Exmouth (including a few residents from Coral Bay) were posted surveys on 16 September 2005. A total of 135 surveys were returned, representing a response rate of 19%. Australia Post advised on 29 September that around 60 surveys were returned to the Perth Mail Centre as 'address unknown'. These surveys were never recovered. This number was deducted from the sample size in accordance with general practice. This provided a final response rate of 21%. For a population of 2500 and a response rate of 20% a sample size of around 670 is required. This equates to a sampling error (standard error of a proportion) of $\pm 10\%$. Only six responses were received from Coral Bay (4% of surveys or 25% of Coral Bay residents in the sample). An additional eight surveys were received that were not part of the random sample. These surveys were photocopies of the survey distributed by individuals independent of the research and have not been included in the main survey analysis.

Fifty-four per cent of respondents were male and 46% female. This gender ratio is consistent with the 2001 ABS census figures for the Shire of Exmouth, which was 53:47 (ABS, 2003, no.584). In terms of age categories, the survey profile has a trend that is consistent with the age profile for the Shire of Exmouth based on the 2001 ABS census. The only major difference is a 2.3% response in the 18–20 years age category, which is well below the 2001 ABS figure of 12%.

⁴ This chapter was co-authored with Colin Ingram, who carried out the resident survey as part of his Masters Thesis research at Curtin University of Technology.

Resident Characteristics

The survey found that 16.1% of respondents worked in the tourism industry (which is similar to Hollett's 2001 survey which found that 17.6% of respondents worked in tourism and the 2001 Census which reports that 16.1% of residents work in accommodation, cafes, restaurants, cultural and recreational services). Most of these respondents (11.5% altogether) were self-employed in the industry. Others worked in other industries (44.2%), the government (22.9%), or were unemployed (3.8%) or retired (13.0%). In terms of length of residence, 19.7% had lived in the Shire of Exmouth for less than three years, approximately one-third (34.8%) had lived in the Shire of Exmouth between three and 10 years, almost another third (31.1%) between 10 and 20 years, and 14.4% for longer than 20 years.

Recreational Fishers

A question about the prevalence of recreational fishing and other activities was included, but unfortunately a formatting error in the survey form meant that results for this question were not valid. We can note that in a 2001 survey, Hollett (2001:73) found that 57% of residents engage in shore-based fishing and 60.6% of residents engaged in boat fishing, although there was no mention in the survey of how many undertook both forms of fishing collectively. Therefore, it can be expected that the proportion of residents who engage in recreational fishing (either boat or shore-based) was higher than this. Hollett's study found that 62% engage in snorkelling from shore, 42.3% engage in snorkelling from a boat, and 83.9% engage in 'beach activities'. Hollett's study also found that 52% of residents owned a boat, and that residents spent on average 16.5% of their income on recreational activities.

The current survey asked respondents to rate the importance of recreational fishing in the Ningaloo Marine Park (as opposed to indicating whether they simply engaged in the activity), with the results shown in Table 16.

Table 16 Importance of fishing

Importance	Residents(%)
Not at all important	5.3%
Not very important	8.3%
Neutral	18.9%
Important	15.2%
Very important	46.2%
Unsure	6.1%

With 61.4% of respondents rating recreational fishing as important to very important, it is clear that fishing has a high priority among recreational activities of residents in the Shire of Exmouth. However, fishing was behind swimming, snorkelling/diving and camping in terms of activities with the highest importance rating. The fact that residents place a high importance on camping indicates that some of the campers along the Ningaloo coast are locals. However, the July 2006 coastal camping survey (see Chapter 3) showed only one local resident was camping out of the 347 campers surveyed, which might indicate that local residents tend to camp more in the off-season when there are less crowds or in areas away from the pastoral stations.

Table 17 shows activities that residents rate as important or very important in the Cape Range National Park or Ningaloo Marine Park.

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Table 17 Non-fishing activities rate as important or very important

Activity	Residents overall (%)
Swimming	72.7%
Snorkelling/diving	69.7%
Boating/sailing	56.2%
Canoeing/kayaking	19.7%
Bushwalking/hiking	29.6%
Wildlife viewing/bird watching	37.1%
Sightseeing	45.4%
Picnicking/BBQing	52.2%
Relaxing/reading	40.1%
Climbing/abseiling	6.8%
Cycling	11.3%
Camping	62.2%
Other	10.6%

Attitudes to the Sanctuary Zone Changes

The majority of respondents (81%) felt that the Marine Park and National Park had (or would have) at least some impact on their level of access to recreational fishing. A response bias caused by residents with strong feelings about the sanctuary zone extensions being more prone to replying to the survey cannot be ruled out. It is interesting that in January 2005 the Shire of Exmouth received a petition of 700 signatures from Exmouth residents opposing the extension of the sanctuary zones (Shire of Exmouth, 2005:11). However, with the Shire of Exmouth having a population of 2231 people (ABS, 2001), and the scope and method of the petitioning process being unknown to the project team, it is not possible to independently establish how widespread resident opposition to the changes was based on this petition.

When asked to rate the impact of the parks on recreational fishing access, almost two-thirds (65.9%) regarded it as negative. All but one of the residents surveyed were aware of the sanctuary zone expansion. As shown in Table 18, a slight majority of residents (54.5%) disagreed with the sanctuary zone expansion, although this was slightly higher among those that rated recreational fishing as important or very important, with two-thirds (66.7%) disagreeing with the sanctuary zone extension (i.e. the sum of ‘strongly disagree’ and ‘disagree’ responses).

Table 18 Agreement with sanctuary zone boundaries

Agreement	Residents overall	Fishing as important
Strongly disagree	37.1%	49.4%
Disagree	17.4%	17.3%
Neutral	17.4%	14.8%
Agree	11.4%	9.9%
Strongly agree	12.9%	4.9%
Unsure	3.8%	3.7%

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There was a significant association between rating fishing as important and disagreeing with the expanded sanctuary zones ($\chi^2 = 10.9$, $N = 120$, $p < 0.01$).

Table 19 indicates that a slight majority (57.6%) of respondents felt that the changes to the sanctuary zones and boundaries of the Marine Park had affected their activities or those of members of their household, with 68.8% of those rating fishing as important feeling that their activities had been affected.

Table 19 Effect of sanctuary zone changes on household activities

Change	Percentage
Yes	57.6%
No	37.9%
Unsure	4.5%

Respondents were given the opportunity to provide a brief comment regarding specific ways that their activities had changed (keeping in mind that residents were sent the survey on 16 September, and legislation enforcing the new regulations was passed on 23 September). There were 74 responses received. Most involved short statements that fishing areas were now restricted, such as 'the best fishing spots are no longer available'. Some noted specific problems, such as being more subject to windy conditions (presumably because they were now fishing further from the shoreline and protected bays), which was particularly a problem for those in small boats. Several mentioned restrictions related to camping, with some specifically referring to crowding during peak tourism periods. Confusion over zonal boundaries was mentioned by some. The loss of favoured crayfish diving sites was mentioned by several residents. Less mention was made by residents (compared to station campers) regarding boat crowding and travel distance, presumably because they already had to boat considerable distances or travel significant distances to launch their boat, and because of this could be more selective in where they fished with respect to the available fishing zones. It is likely that this also applies to recreational fishing visitors staying in the Shire of Exmouth, who also have more selectivity in where to launch their boats than station campers. Obviously, the size of the boat used for recreational fishing is an important factor in this respect, and future surveys should take into account boat length of vessels used in boat fishing by residents and different visitor segments.

There was an association between importance attached to fishing in the Marine Park and feeling affected by the sanctuary zones ($\chi^2 = 14.4$, $N = 118$, $p < 0.01$), and, perhaps not surprisingly, a strong association between feeling affected by the expanded sanctuary zones and disagreeing with them ($\chi^2 = 36.8$, $N = 122$, $p < 0.01$). The rate of feeling that one's activities have been affected by the expanded sanctuary zones is cross-tabulated in Table 20 against whether or not fishing was rated as important.

Table 20 Effect of sanctuary zones on household activities vs importance of fishing

Fishing	Activity Affected	Activity not affected
Rated as important	69.1%	30.9%
Not rated as important*	37.2%	60.5%

* includes the respondent category of 'neutral'

There was also less agreement that the 2004 sanctuary zones would have a positive effect on the local economy than the previous zonal arrangement, which was particularly the case for recreational fishers (shown in brackets), as shown in Table 21.

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Table 21 Positive effect on the local economy (fishing as important in brackets)

% Agreement	1987 zones	2004 zones
Strongly Disagree	12.1 (14.8)	34.8 (42.0)
Disagree	4.5 (4.9)	17.4 (22.2)
Neutral	24.2 (24.7)	22.7 (13.6)
Agree	28.0 (27.2)	7.6 (4.9)
Strongly Agree	12.1 (9.9)	6.8 (6.2)
Unsure	18.9 (18.5)	10.6 (11.1)

In all, close to two-thirds of respondents (64.2%) felt that the expanded sanctuary zones would not have a positive effect on the local economy. It would have been interesting to know the rate of agreement to this question when the 1987 zones were introduced, as it is possible that a degree of acceptance emerges with time. At any rate, these findings will serve as a useful measure for later follow-up surveys.

Attitudes to DEC

Hollett's (2001) survey found that 53.2% of respondents placed a very high priority on protection of the environment, with another 39.7% having some concern about its protection. The 2006 resident survey focused on the value of the Marine Park and National Park to social and economic matters. The survey found that 75% of residents felt that the parks (Marine Park and National Park) contribute to tourism development, with almost half (47.6%) seeing this contribution as very important. With respect to the economy, approximately two-thirds of respondents (67.7%) felt that the parks made a major contribution to the economy. Three-quarters of respondents (74.2%) felt that the parks made a major contribution to the local lifestyle.

The survey inquired about a whole range of attitudes relating to local DEC management, only some of which will be discussed here. There was an association (established through chi-square tests, where $p < 0.01$) between rating fishing as important and being dissatisfied with DEC's approach to the following matters: local conservation and environmental management; tourism; local social issues; understanding residents' expectations; involving the community in implementation of plans or projects; responding to community concerns; communicating effectively with the community; and achieving fair outcomes for the community. While the associations with those rating fishing as important were significant, the association between dissatisfaction with DEC on these matters and disagreement with the expansion of the sanctuary zones was even stronger, particularly regarding: DEC's approach to local conservation and environmental management; their economic approach; achieving fair outcomes for the community; understanding residents' expectations; being responsive to community needs; and their approach to social issues.

Visitation Rates

Respondents were asked how many times in the last year-and-a-half they had visited Cape Range and the Marine Park based on six-monthly intervals. The aim was to determine whether their rate of visitation had changed since the expansion of the sanctuary zones, and to also take into account seasonality in visitation. The results are shown in Table 22.

Table 22 Number of Visits to Ningaloo MP/Cape Range NP

Times visited	Dec 2003- May 2004 (%)	Jun 2004- Nov 2004 (%)	Dec 2004- May 2005 (%)
0	5.0	8.1	0.8
1-10	55.5	50.0	60.0
11-20	14.3	14.5	13.1
20+	25.2	27.4	26.2

It should be noted that the variable effect of memory may be an issue when interpreting these results. They do, however, suggest a high rate of visitation to the Marine Park by residents, which did not abate despite the expansion of the sanctuary zones. This perhaps should not be surprising, given the importance attached to a wide variety of activities within the Marine Park.

Conclusion

The results of the survey indicate that residents in the Shire of Exmouth have not decreased their visitation of the Marine Park since the expanded sanctuary zones were announced in November 2004, and that the visitation rates identified therefore represent an accurate baseline for respondents' use of the Marine Park. Whether such rates are reliable for the whole Exmouth resident population, however, is uncertain, given the potential effect of response bias. It is of course possible that those who more regularly use the Marine Park are those who were more likely to respond to the survey.

While it is difficult to establish relationships of causality, it is likely that there has been a significant fall-out in terms of support for DEC's approach to management, and that such negativity extends beyond (although is more evident among) the fishing section of the community. It will be interesting to gauge any changes in community perceptions of DEC with the passage of time, as at the time of the survey, it was clear that tensions over the sanctuary zone expansion were still simmering.

With respect to the matter of community support of sanctuary zone management, it is interesting to note that according to Taylor and Buckenham (2003:32), local support for marine reserves in New Zealand has been divided between conservationists and recreationists. Indeed, public opposition to marine reserves is very common world-wide, with some proposals in the United Kingdom being derailed by public opposition (Laffoley, 1994). Chadwick (1998) found that communities struggle to provide support for the conservation of marine resources when protection is perceived to be thrust upon them, and that support is greatly dependent on who is in charge of planning and the amount of community input involved. Wolfendon et al (1995) note that failure to properly anticipate and interpret community views can result in delays in decision-making and poor public relations. The experience of the 2004 expansion of sanctuary zones in Ningaloo arguably accords with this scenario. While there is no suggestion being made here that the consultation process for the Ningaloo Management Plan was inadequate, it is certainly acknowledged that some sections of the community perceived it to be so.

Using three New Zealand case studies, Taylor and Buckenham (2003) illustrate how community attitudes towards marine reserves tended to soften as time passed. An initial period of opposition based on a perceived disruption of fishing activities and fears of negative impacts gave way to lifestyle adaptation and grudging acceptance, with more favourable community attitudes eventually emerging (also see Ryan, 1995). Although such a unidirectional change in community attitudes should not be seen as universal, it does demonstrate the way that community attitudes can undergo change over time.

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It would be wrong, however, to characterise the situation as simply a matter of the community becoming more environmentally conscious, as though opposition is borne from an anti-environmental stance. In fact, the 1999 survey (Patterson Market Research, 1999) found that the majority of Gascoyne residents were favourably disposed to environmental issues, with only 45% willing to accept some environmental losses in exchange for more job opportunities in the region, and only 8% strongly agreeing with this notion. The concerns of local residents not only relate to issues surrounding their lifestyle (both in recreational and economic terms) but also their rights to manage their own affairs. As areas declared off-limits to visitors, sanctuary zones accord with direct management techniques as opposed to indirect techniques (Newsome, Moore & Dowling, 2002), where prohibition to utilise certain areas rather than encouragement to avoid or self-regulate utilisation of such areas determines access patterns. The Ningaloo debate has been very much one centred on the issue of control and ownership over Ningaloo. The fundamental question has been, who owns Ningaloo? As a legal question, the answer is beyond dispute—the Western Australian government owns the State waters, while the Commonwealth government owns the outer zone. But a variety of stakeholders—Exmouth residents, long-term visitors, and environmental groups—claim ownership of the Ningaloo coast in their own way. Much like the station campers who associate sanctuary zones as a violation of their rights and freedoms, so too do local Exmouth residents see the sanctuary zone decision as an unnecessary intrusion into their affairs. Separating the politics surrounding the management plan and the actual impacts of the sanctuary zones on residents' activities is difficult for this reason. Consequently, it is important to keep in mind Northcote and Macbeth's (2005) warning about interpreting the results of resident perception surveys as measures of impacts in the absence of objective impact data.

Chapter 5

NINGALOO TOURISM TRENDS

Introduction

In this chapter, a number of indicators will be examined in order to establish baseline data and determine whether there have been short term changes in visitation levels that might be attributed to the expansion of the sanctuary zones. The selection of indicators was predominantly governed by the limited sources of data available rather than what was ideal from a tourism monitoring point of view. Nevertheless, some of the available indicators proved more useful than others. Consequently, the following examination of tourism trends on the Ningaloo coast will be presented in terms of an audit of those indicators, so that future researchers employing these indicators are aware of their value for tourism monitoring.

IVS and NVS Data

The International Visitor Survey and National Visitor Survey (administered by Tourism Research Australia) measures annual visitation rates of people aged 15 years or over to Australian destinations, including the shires of Exmouth and Carnarvon. IVS surveys are administered at main airports, while NVS surveys are administered to residential households over the phone. Visitation estimates for the Shire of Exmouth are shown in Table 23.

Table 23 Shire of Exmouth Overnight Visitor Origin

Overnight Visitors	Annual Average 2001 & 2002		Annual Average 2002 & 2003		Annual Average 2003 & 2004		Annual Average 2004 & 2005	
	Visitors	%	Visitors	%	Visitors	%	Visitors	%
Domestic Visitors ⁽¹⁾	75,500		80,000		74,500		68,000	
Interstate	22,000	21%	20,000	18%	15,500	15%	17,500	19%
Intrastate	53,500	51%	60,000	55%	59,500	57%	51,000	54%
International Visitors ⁽²⁾	29,200	28%	30,000	27%	29,600	28%	25,800	27%
Total Overnight Visitors	104,700	100%	110,000	100%	104,100	100%	93,800	100%
Overnight Visitor Nights								
Domestic Nights	447,500		503,500		468,500		467,000	
Interstate	67,500	12%	60,500	10%	54,000	9%	61,500	11%
Intrastate	380,500	65%	443,000	71%	415,000	72%	406,000	71%
International Nights	136,100	23%	124,800	20%	111,100	19%	102,700	18%
Total Nights	583,600	100%	628,300	100%	579,600	100%	569,700	100%
Average Length of Stay								
Domestic Stay (nights)	5.9		6.3		6.3		6.9	
International Stay (nights)	4.7		4.2		3.8		4.0	

Source: Tourism Research Australia - National Visitor Survey (NVS) and International Visitor Survey (IVS)

Source: TRA

It should be noted that IVS and, in particular, NVS data are extrapolated figures that are based on a low sample for the Shire of Exmouth (as it is for most smaller regional destinations), which is why Tourism Western Australia wisely aggregate the data into a two-year rolling average. Although a rather crude measure, the IVS and NVS data indicate a downturn in visitor numbers since a peak in 2002–03. We are most likely seeing in these figures a symptom of the decline in the domestic visitor market (TRA, 2006:30), which particularly hit major regional tourism areas located away from capital cities. However, the figures indicate a marginal increase in the interstate visitor market despite the decline in intrastate visitors, which might be accounted for by the growth in the caravan touring market, discussed later.

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The sample size for the IVS for each year is relatively robust (N > 100), which enables an annual time series for international visitors to the Shire of Exmouth to be provided in Table 24.

Table 24 Estimate for international visitors to shires of Exmouth, Shark Bay and Carnarvon

Year	Exmouth	Shark Bay	Carnarvon
Jan 2001 – Dec 2001	28,300	50,800	31,400
Jan 2002 – Dec 2002	30,000	42,500	29,000
Jan 2003 – Dec 2003	30,000	47,200	36,400
Jan 2004 – Dec 2004	29,200	37,100	29,700
Jan 2005 – Dec 2005	22,400	34,500	27,900

Source: TRA (International Visitor Survey)

The decline in international visitors in 2005 (by almost 25%) after four years of consistent visitation levels is the notable feature of the time series for the Shire of Exmouth, with the shires of Shark Bay and Carnarvon experiencing a more sustained decline since a peak in 2003. International caravan and campers was one category that suffered decline in 2005 for the Shire of Exmouth, as shown in Table 25.

Table 25 Estimate for international caravanners to shires of Exmouth, Shark Bay and Carnarvon

Year	Exmouth	Shark Bay	Carnarvon
Jan 2001 – Dec 2001	11,000	21,900	15,500
Jan 2002 – Dec 2002	13,300	20,300	14,900
Jan 2003 – Dec 2003	14,600	18,700	19,900
Jan 2004 – Dec 2004	15,700	20,300	16,300
Jan 2005 – Dec 2005	9,800	11,900	11,800

Source: TRA (International Visitor Survey)

The Shire of Shark Bay showed a similar decline in international caravanners in 2005, while hotel/motel/resort stayers and backpackers remained steady, with the situation the same in the Shire of Carnarvon. Although international visitors are not an intensive fishing group, it might be expected that the caravan and camper segment of international visitors would have a higher rate of participation in recreational fishing than other international visitor segments (although the data is not available to confirm this).

Visitor Centre Door Counts

As a means of triangulation, the Exmouth Visitor Centre supplied the project team with monthly figures of door visits to their centre, displayed in Table 26.

Table 26 Exmouth Visitor Centre door counts

Year	Customers
Jul 2003 – Jun 2004	124,733
Jul 2004 – Jun 2005	104,122
Jul 2005 – Jun 2006	116,572

Source: Exmouth Visitor Centre

In terms of representing overall visitor numbers to the region, the figures need to be interpreted

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cautiously. Some of those counted may be visitors entering the Centre on multiple occasions. This is particularly likely, given that the figures exceed the estimated total number of visitors to Exmouth Shire discussed in Chapter 2 (93,800 visitors), and also given that a reasonable number of visitors would not be included in the statistics. Those who are unlikely to be included are return visitors who simply do not visit the centre upon entering Exmouth, or members of travelling parties that stay in the car while others make the booking. Despite the limited nature of the statistics in terms of providing an overall estimate of visitors to Exmouth, the data was felt to be useful for revealing fluctuations in visitor numbers useful for impact monitoring. However, caution needs to be exercised in interpreting the figures, given that fluctuations could be partly due to the changing marketing position of the visitor centre. In other words, it is conceivable that visitation rates to Exmouth remain constant, but fluctuations in awareness of the visitor centre affect customers entering its doors. It is therefore important that door figures are viewed in relation to other indicators. At any rate, the visitor statistics do not indicate a discernable level of change over the three year period in which door entry counts were taken.

ABS Accommodation Data

The Australian Bureau of Statistics collects a range of data relating to hotel, motel, caravan park and hostel accommodation for local government areas (referred to as the Survey of Tourist Accommodation). It is a mail out collection survey that includes all providers, and therefore is not affected by sampling variability. However, response rates may vary, with generally between 80–90% returns nationwide (ABS, 2006). In such cases, the ABS employs extrapolation procedures to allocate values to missing data.

Unfortunately, in the case of the Shire of Exmouth, the ABS data provides limited time series data. Much of the data is subject to suppression due to confidentiality rules under the Census and Statistics Act. This suppression is undertaken by the ABS on those occasions when a particular accommodation provider may account for a sufficient percentage of the overall turnover that it risks being identified. With only three hotel/motel establishments in Exmouth, it is often the case that one provider accounts for the majority of turnover. In contrast, the figures for the six accommodation providers in the Shire of Carnarvon are complete for every month since January 2003. Unfortunately, it is not possible to disaggregate the figures for providers at Coral Bay from those at Carnarvon.

In general, the ABS accommodation data for understanding fluctuations in visitation for the Ningaloo Coast is limited due to missing data. Another problem is that even the available data can be misleading due to variability in marketing and pricing. As an example, in September 2003 Exmouth hotels/motels reported 3435 guests that stayed a total of 7089 guest nights with total revenue of \$264,000. In September 2004, the same hotels/motels reported only 2622 guests that stayed a total of 3,938 guest nights. However, the total revenue was considerably higher—\$334,000. This is explained by an increase in room rates, increasing from an average of \$58.80 per room in September 2003 to \$84.70 in September 2004. These fluctuations in pricing can obviously have a direct impact on visitation rates to Exmouth, and are just one of the confounding factors that need to be taken into account when assessing changes in visitation.

The statistics for caravan parks in the Shire of Exmouth are less subject to suppression than hotel/motel figures, due Exmouth's four caravan parks tending to share the visitor market to a greater extent. However, a major gap exists in the time series data for Exmouth caravan parks because the ABS did not collect caravan park data in Australia in 2004—the year preceding the sanctuary zone extension, and hence the best year for establishing a baseline level. Nevertheless, investigation by the project team indicates that caravan park revenue has steadily increased since 2003, with 2004 and 2005 both recording increased revenue, although received revenue levelled out in 2006 (ABS, 2007).

DEC Camping Revenue

DEC camping revenue offers an indicator for changes in wilderness camping in the Cape Range National

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Park. DEC collect fees from campers for each night stayed. Camping cost \$5 per adult per night, with school-aged children under 16 years \$2 per night and those under the age of five years free of charge. Camping revenue figures were provided by DEC for each month. However, due to considerable variability in the date when receipts are processed (Peter Ryan, 2006, personal communication), monthly figures are not always an accurate indicator of actual monthly takings. This was confirmed by a count of the original receipts for selected months by the project team, which showed up to 30% variability between actual receipt figures and reported revenue totals. This casts serious doubt over the validity of month by month totals recorded by DEC, and suggests that it is better to consider accumulative totals, such as annual counts, as shown in Table 27.

Table 27 Cape Range official camping receipts

YEAR	REVENUE
Jan 2000 – Dec 2000	\$109,984
Jan 2001 – Dec 2001	\$156,369
Jan 2002 – Dec 2002	\$175,462
Jan 2003 – Dec 2003	\$180,219
Jan 2004 – Dec 2004	\$194,084
Jan 2005 – Dec 2005	\$172,720

Source: Department of Environment and Conservation

The annual totals reveal a steady upwards trend between 2000 and 2004 and a drop in 2005. Given the variable length of stay of campers, it is not possible to determine the number of campers who stayed in Cape Range National Park based on these figures. This can only be determined through examination of the original receipts. Limitations on project funding allowed the receipts of only selected months to be tallied by the project team. In April 2006, 478 vehicles camped for a total of 1415 nights—an average of three nights per vehicle group (SD = 3.0). The number of campers was 1035 adults and 99 children (children classified as being under 16 years of age)—a total of 1134 campers altogether. For July 2006, 433 vehicles camped for a total of 2050 visitor nights—an average of 4.7 nights per vehicle group (SD = 5.5). The number of campers was 891 adults and 99 children (990 campers altogether). Interestingly, although DEC received a considerably higher revenue from camping in July than in April, the number of visitors was in fact higher in April due to a lower average length of stay—again pointing to the problem of monthly comparisons based on financial data alone. These potential variations also need to be considered in comparisons from one year to the next, for it is not possible to determine to what degree the volume of visitors changes as opposed to their length of stay.

In conclusion, it is not possible to derive camper numbers from revenue totals without information about length of stay. While the project team collated these items of information for April and July 2006, the current project did not possess the level of funding required to collate it for the other months, although this would be a worthwhile task for future investigation. As a long-term monitoring solution, it would be hoped that the Department of Environment and Conservation might consider introducing an automated procedure for electronically recording receipt data.

While visitor numbers cannot readily be extrapolated from the figures, it may be useful to treat the camping receipt figures as a combined indice of visitor numbers and length of stay. A close analysis of the data by six monthly intervals indicates that the period January to June 2006 showed an upturn in revenue (compared with the same period in 2005), indicating a possible revival of the camping visitation sector during this period, although one that is not matched in the Cape Range visitor market generally.

DEC aerial surveys

One of the more useful—but nevertheless limited—sources of data is the aerial survey counts carried out by DEC on a bi-annual basis. This data enables some degree of monitoring of changes to the number of

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pastoral station wilderness campers, as shown in Table 28. Aerial counts are undertaken through a single fly-over in April (during the Easter break) and July (during the school holidays) each year. Counts are performed on camping clusters—that is, tents, caravans, campervans or camping trailers that are in close proximity and orientation to one another. It is assumed that each cluster represents a discrete travelling group. It covers Cape Range National Park, the camping areas around the RAAF bombing range, and three pastoral stations. It does not include the areas south of Amherst Point, including Gnaraloo Station and Red Bluff, as these areas were not part of the Marine Park prior to December 2004.

Table 28 Aerial survey of camping clusters

April	1998	1999	2000	2001	2002	2003	2004	2005	2006
Cape Range NP	30	7	32	35	49	57	54	77	54
Bombing Range	9	1	2	10	2	25	15	13	39
Ningaloo	19	14	60	36	84	87	73	79	93
Cardabia	4	6	4	6	8	14	1	5	3
Warroora	18	15	27	22	43	72	39	37	57
	80	43	125	109	186	255	196	211	246

July	1998	1999	2000	2001	2002	2003	2004	2005	2006
Cape Range NP	79	71	94	116	89	105	107	107	109
Bombing Range	43	25	35	35	46	63	38	28	35
Ningaloo	107	141	141	154	208	202	181	97	165
Cardabia	33	28	29	46	24	27	27	11	26
Warroora	96	92	105	121	110	140	111	122	109
	358	357	404	472	477	537	450	356	444

Source: Department of Environment and Conservation

The trend shows a steady increase in both April and July camping groups in the years between 1998 and 2003, particularly for the larger pastoral camping sites of Ningaloo and Warroora. There was a noticeable drop in the camping numbers for the bombing range and Warroora in 2004 and for Ningaloo in July 2005. Ningaloo station was most affected by the expansion of the sanctuary zones, therefore Ningaloo's drop is significant because it occurs after the expansion. There was, however, a strong recovery in camping numbers at Ningaloo station in both survey periods in 2006. With the survey of pastoral station campers (Chapter 3) indicating that campers are generally long-term visitors to the region, it is clear that the increase in camping numbers cannot be accounted for by new types of visitors arriving. Given that the 2006 aerial survey was carried out in the year following the introduction of legislation enforcing the expanded sanctuary zones, the similarity of the camping rate compared to 2004 is rather telling, and reinforces the findings from the 2006 camping survey that sanctuary zone changes have had little impact on camper numbers. The trend identified in the camping survey towards the relocation of campers to areas adjacent to general use zones in 2006 receives some support from the findings of a sector analysis of the aerial survey data (Table 29). Note that sector names in the following table are arranged in order from northern to southern locations. For the approximate location of sectors, see Figure 3 which contains some of the place names listed.

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Table 29 Sector breakdown of Ningaloo coast aerial survey

April	1998	1999	2000	2001	2002	2003	2004	2005	2006
Yardi Creek	1	0	2	2	0	9	6	11	6
Bombing Range	9	1	2	10	2	25	15	13	39
Winderabandi	9	6	23	19	44	38	39	36	28
Lefroy Bay	9	8	34	16	38	48	26	42	65
Ningaloo	0	0	2	0	1	1	3	1	0
Jane Bay	1	0	1	1	1	0	8	0	0
Dugong Sanctuary	0	0	0	0	0	0	0	0	0
Bruboodjoo	4	6	4	6	8	12	1	0	3
Mauds	0	0	0	0	0	0	0	0	0
Coral Bay	0	0	0	0	0	0	0	0	0
Pearson	0	0	0	0	0	2	0	5	0
14 Mile	4	4	16	6	27	37	30	19	23
Pelican Point	1	1	1	1	0	3	1	5	20
Stevens	13	10	10	15	16	32	13	13	14

July	1998	1999	2000	2001	2002	2003	2004	2005	2006
Yardi Creek	3	4	9	14	11	24	18	18	21
Bombing Range	43	25	35	35	46	63	38	28	35
Winderabandi	20	31	50	36	36	41	52	32	40
Lefroy Bay	75	85	76	78	134	129	95	39	113
Ningaloo	0	2	1	1	3	5	2	2	1
Jane Bay	11	18	14	39	35	27	28	24	11
Dugong Sanctuary	1	5	0	0	0	0	0	0	0
Bruboodjoo	33	26	27	46	24	22	27	8	18
Mauds	0	2	2	0	0	5	0	2	8
Coral Bay	0	0	0	0	0	0	0	0	0
Pearson	0	0	0	0	0	0	0	0	0
14 Mile	57	76	58	73	71	85	47	76	48
Pelican Point	9	0	0	11	5	9	9	22	29
Stevens	30	16	47	37	34	46	55	16	32

Source: Department of Environment and Conservation

Camping groups in Jane Bay at Ningaloo Station, which became enclosed by sanctuary zones, decreased from 28 groups in July 2004 and 24 groups in July 2005 to just 11 groups in July 2006. This is all the more significant, because 2006 was a year that saw large numbers of campers return to Ningaloo Station. It was the camping areas adjacent to general use and recreation zones to the north, Lefroy Bay in

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particular, that experienced the large boost in numbers, increasing from 95 camping groups in July 2004 and 39 camping groups in July 2005 to 113 camping groups in July 2006. The figures for March reveal a similar trend for these sectors. This is consistent with the change in behaviour indicated by the camping survey results discussed in Chapter 3, where some campers indicated that they were relocating to areas with closer access to recreational zones. However, this matter is in need of further investigation.

One of the limitations of the aerial survey data is that it is carried out on only two occasions each year and during the school holidays, and therefore does not necessarily serve as a reliable indicator for overall wilderness camping levels in the year concerned. For example, if April or July are unseasonably wet, as both months were in 2005, then it may be the case that campers may delay their trip to the Ningaloo coast to a later month.⁵ The variability in group sizes is another problem when interpreting the data, as the number of persons in a camping cluster may differ from one survey to the next. The subjectivity involved in defining what is and is not a 'cluster' is yet another problem involved with the data. For these and other reasons, the aerial survey figures must be interpreted with some caution.

DEC Cape Range Visitation Statistics

As the northern gateway to the Ningaloo coast, the vehicle counter near the entrance gate at Cape Range National Park offers a promising means for measuring visitation levels. The vehicle counts are calculated using a unidirectional traffic counter placed 500 metres south of the entrance station (registering cars entering the National Park from the north). There is only one other entrance to the coastal section of the National Park, which is Yardie Creek to the south. It too has a traffic counter (registering cars entering the National Park from the south), but due to flooding (including occasions when the road—and the metro-counter—is washed out), its counts are too unreliable to be of use. Another traffic counter is located on the turnoff road to Turquoise Bay.

The metro-counter is sensitive to weight and length of the vehicle, and can therefore identify vehicle type, such as sedans, buses and vehicles with trailers. DEC employs a passenger estimate for each vehicle type, which is used to estimate visitor numbers. Estimates are shown in Table 30.

Table 30 DEC visitor estimates for Cape Range National Park

YEAR	VISITORS
Jul 2003 – Jun 2004	163,668
Jul 2004 – Jun 2005	151,708
Jul 2005 – Jun 2006	143,241

Source: Department of Environment and Conservation

The results indicate a downward trend in visitation rates to Cape Range National Park since 2003. A closer examination (by six monthly intervals) indicates that the downward trend has been continuous since the second half of 2003 (figures for the two years prior to this are not available). This is consistent with the trend data from TRA and the DEC aerial surveys discussed above, but is inconsistent with the Exmouth Visitor Centre door counts and caravan park turnover data that indicates an increase in the tourism market in 2005–06. The downward trend in protected area visitation but not in Visitor Centre clients and caravanners is best explained by the NVS results that indicate a decline in intrastate visitors (i.e. those who mostly utilise the National Park) but a concomitant increase in interstate visitors (mostly caravanners who are the ones perhaps most likely to make use of the Visitor Centre).

⁵ In April 2005, the monthly rainfall was 76.2 mm, compared to the average rainfall of 16.5 mm for April. In July 2005, the monthly rainfall was 55.2 mm, compared to the average rainfall of 22.8 mm for July (Learmonth Office of the Bureau of Meteorology, 2005).

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In order to confirm whether the downturn in National Park visitors was extra-regional in nature, a comparison was undertaken with the DEC visitor statistics for Shark Bay. The importance of setting up a comparison region to serve as a control area is essential for determining whether non-local factors are involved. The rationale is that wider regional, national and international factors will impact other areas. Therefore, fluctuations that are recorded in two areas simultaneously are likely to be caused by the same wider factors. However, it should not be assumed that wider effects should be felt equally between areas. For example, the effect from the Bali Bombings would likely drive up domestic tourism in some destinations over others—namely, those destinations like Broome that may attract a similar tourist market as Bali (i.e. resort-style tourists). With regard to the effect from fuel increases, this is more likely to affect drive-based destinations, particularly those at greater distances from main population centres.

It is important when undertaking inter-regional comparison to ensure that the characteristics of each destination are as similar as possible. This is the basic principle of experimental research: to take two groups with closely matched characteristics; subject one to the measured effect (the experimental group) and leave the other one as is (the control group); perform a follow-up measure; and ascertain whether there is a difference between them. If the two groups were closely matched to begin with, but now showed a salient difference, then the change was most likely caused by the introduced variable. If the two groups were not identical to begin with, it is not possible to determine whether the resulting difference is due to the introduced variable or to inherent differences between the two groups. The second requirement is that the control group is insulated from the introduced variable. So, for example, Carnarvon would be unsuitable as a control area, because its proximity to the Ningaloo Marine Park means that it experiences residual effects (and arguably more direct effects) from sanctuary zone changes in Ningaloo. A third requirement is that the set of indicators and data quality for measuring change are identical for both areas.

Shark Bay was identified as the best (although not ideal) control area, given similarities in its tourism development, visitor attractions (namely, marine-based attractions, particularly the dolphins at Monkey Mia), and Protected Area characteristics (including sanctuary zones). It is important to keep in mind, however, that the Shire of Shark Bay has a different visitor profile, based largely on two factors: the greater interest by international visitors in the area; the fact that its main marine attraction—dolphins—are present throughout the year, creating less prominent seasonality (see Chapter 6). With these considerations in mind, the Monkey Mia visitor counts are presented in Table 31 alongside the Cape Range counts.

Table 31 Visitors to Monkey Mia

Year	Cape Range Visitors	Monkey Mia Visitors
Jul 2003 – Jun 2004	163,668	108,554
Jul 2004 – Jun 2005	151,708	91,743
Jul 2005 – Jun 2006	143,241	86,156

Source: Department of Environment and Conservation

The Shark Bay figures reveal the same downward trend evident in the Cape Range figures, with a closer order analysis (by six monthly intervals) indicating that the decline has been relatively constant.

Charter Boat Tours

Data provided by the Department of Fisheries (DOF) indicates a general downturn in the charter boat industry for Exmouth in the last few years (

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Table 32), with a quite dramatic decline in charter tours departing from Exmouth in 2005.

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Table 32 Exmouth charter boat tours (2002–05)

Year	Clients	Tours	Active Licenced Operators
2002	4068	410	17
2003	2848	232	18
2004	3209	372	16
2005	1600	216	12

Source: Department of Fisheries

This decline is associated with a marked reduction in the number of active licenced operators. However, a breakdown of the charter tours by activity, as shown in Table 33, indicates that the decline in 2005 was not related to fishing activity (although the high number of unspecified activities means that it is necessary to treat the data with caution). Note that ‘other activities’ refers to wildlife observation, sight-seeing, snorkelling and diving, while ‘unspecified activities’ refers to incomplete returns from operators.

Table 33 Exmouth clients by activity

Year	Fishing only participants	Combined fishing	Other activities	Unspecified activities
2002	2264	59	1157	588
2003	291	45	2326	186
2004	590	136	1679	804
2005	565	1	919	115

Source: Department of Fisheries

The decline in charter boat users engaging in ‘activities other than’ is probably explained by the 25% drop in international visitors (see Table 23), who are probably more likely to engage in activities such as whale shark watching, diving and snorkelling. Further, when tours to the State waters of the Ningaloo Marine Park (see) are disaggregated from the overall total, the downward trend all but disappears (Table 34).

Table 34 Exmouth charter boat tours to Ningaloo Marine Park State Waters

Year	Fishing only participants	Combined fishing	Other activities
2002	428	49	666
2003	45	40	1206
2004	49	12	477
2005	141	1	641

Source: Department of Fisheries

Interestingly, the charter tour data from boats departing from Coral Bay indicates only a marginal decline in the charter boat industry compared to Exmouth (

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Table 35).

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Table 35 Coral Bay charter boat tours

Year	Clients	Tours	Active Licenced Operators
2002	8420	836	11
2003	8792	842	10
2004	7828	756	9
2005	7996	721	9

Source: Department of Fisheries

Again, the decline seems to have occurred principally in activities other than fishing, as evident from an examination of Table 36 (although the high number of unspecified activities warrants caution in making this assumption).

Table 36 Coral Bay clients by activity

Year	Fishing only participants	Combined fishing	Other activities	Unspecified activities
2002	3052	121	4980	267
2003	2629	13	4551	1599
2004	2335	54	3644	1795
2005	2897	36	2828	2235

Source: Department of Fisheries

The decline in other activities is also evident when State waters of the Marine Park are disaggregated from the overall data (Table 37).

Table 37 Coral Bay charter boat tours to Ningaloo Marine Park State waters

Year	Fishing only participants	Combined fishing	Other activities
2002	438	87	4698
2003	176	14	4344
2004	231	54	3426
2005	274	20	2624

Source: Department of Fisheries

The decline is likely due to fluctuations in the international and domestic tourism market, although this is in need of further investigation.

Conclusion

Wider effects on visitation trends constitute a confounding factor in determining changes attributable to the sanctuary zones. Any analysis of changes to visitation numbers has to be able to distinguish between changes in the visitor market due to the sanctuary zone expansion and changes that are occurring regardless. But what might appear to be a discernible trend based on cursory analysis may not turn out to be significant in statistical terms, particularly if the time series data is limited to just a few years.

The cursory trend analysis suggests that there has been a marginal decline in visitation to both Ningaloo and Shark Bay, meaning that the decline was regional in nature, not localised to the Ningaloo coast. It was probably related to the decline in the domestic visitor market generally, with regional areas such as the

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Northern Gascoyne being particularly vulnerable to this decline, due to Perth residents being less inclined to undertake their annual trip to Ningaloo. However, the downturn in domestic tourism probably did not affect the 'grey nomad' caravanner market and other interstate caravanners touring around Australia, which boomed during the same period in accord with growth in this tourism market generally (Tourism Australia, 2005). This could explain the rise in interstate visitors, the rise in caravan park revenue, and the rise in people entering the Exmouth Visitor Centre (i.e. first-time visitors), whilst overall visitor numbers seemed to be in decline. However, this is a theory that remains untested, and the results of a time-series analysis of the data revealed no significant changes, with fluctuations being a purely random pattern (Appendix C).

Chapter 6

CONCLUSION AND RECOMMENDATIONS

Impact Overview

According to TRA visitor survey data, the Ningaloo coast attracted approximately 94,000 tourists in 2004–05 to the Shire of Exmouth. Close to 30,000 visitors to the Shire of Exmouth engage in recreational fishing (approximately one-third of all visitors), and many more may be indirectly related to fishing activity through being companions of visiting fishers. The project team estimates that, altogether, visitors injected \$50 million into Exmouth businesses in 2004–05, including at least \$10 million in accommodation revenue. While detailed data is lacking regarding the value of fishing visitation to the regional economy, it is reasonable to surmise that recreational fishing continues to be an important drawcard for tourism and plays a substantial role in sustaining the region's economy. Any actions that threaten to undermine fishing-based recreation, such as expanding sanctuary zones, therefore need to be studied very carefully to ensure that social and economic impacts are properly weighed against potential environmental effects.

The 2006 camping survey results indicate that station campers in the areas most affected by changes to the sanctuary zones—namely, campers at Ningaloo station—felt most impacted by the changes, which has altered the boating and camping behaviour of at least half of respondents substantially and approximately another quarter to some extent. While it is possible that respondents were prone to exaggerating the effects because of opposition to the sanctuary zone decision, it must be said that in most cases they were able to offer specific reasons for their inconvenience. It would appear to be the case that the changes had led to a concentration of boats in the recreation zones and a higher concentration of campers at favourable sites near those zones, with those located in areas adjacent to sanctuary zones experiencing the added difficulty of boating long distances to these areas or outside the reef. The manner in which these changes impacted on the overall satisfaction of their stay, however, was minimal. This can largely be attributed to the fact that boat fishing was still possible in the reef, and also due to the wide range of activities that campers engage in during their stay, with the overall 'wilderness experience' being maintained despite increased restrictions on boat fishing. The lack of any discernable decline in the number of station campers during the peak seasons of April and July, as determined by the DEC aerial surveys, would tend to support the finding that wilderness campers are still staying on the coast in strong numbers and continuing to engage in fishing.

The results of the 2005 Exmouth resident survey indicate that residents in the Shire of Exmouth have not decreased their visitation of the Marine Park since the expanded sanctuary zones were announced in November 2004, and that the visitation rates identified therefore represent an accurate baseline for respondents' use of the Marine Park. Whether such rates are reliable for the whole Exmouth resident population, however, is uncertain, given the potential effect of response bias. It is of course possible that those who more regularly use the Marine Park are those who were more likely to respond to the survey. On the other hand, the results do indicate that those with a strong attachment to fishing are among those whose rate of visitation has not declined. In contrast to the camping survey results, however, the resident survey findings should be treated as a baseline measure not an impact measure, given that the survey was undertaken around the time of the introduction of legislation in September 2005. A follow-up survey will need to be carried out to determine changes to Marine Park visitation rates.

Finally, the examination of Exmouth visitation trends and human usage provided mixed findings, which is partly due to the lack of a sufficiently long pre-change and post-change time-series for selected indicators and the lack of reliable data for those indicators. There seems to have been a marginal decline in visitation to both Ningaloo and Shark Bay, meaning that the decline was probably regional in nature, not localised to

the Ningaloo coast. It may reflect a decline in the domestic visitor market generally. However, with results from a time-series analysis of the data revealing that the changes to Exmouth visitation were not significant (Appendix C), the findings remain inconclusive. All that can be said with some degree of confidence is that any changes to the Exmouth visitation rates since the expansion of the sanctuary zones have, if evident at all, not been dramatic. It would seem that to date the visitor market has not been unduly affected by the expanded sanctuary zones, and that any concerns that visitor numbers and, in turn, the tourism industry would suffer do not find any support in the data that was collected by the project team.

Threshold of Tolerability and Directions for Future Research

The impacts from management changes in the Marine Park can be conceptualised in terms of a threshold of tolerability (Northcote & Macbeth, 2008). This model holds that people have a number of limits for tolerating changes to a destination, which once surpassed leads them to move to increasingly further distances from the original destination. The threshold is a subjective limit, so it need not correspond to actual impacts, and is not immune to misinformation, exaggeration by users or other sources of distortion in perceptions, as noted by Northcote and Macbeth (2005). In the first stage of expanding sanctuary zones, it could be expected that visitors and residents who come to Ningaloo for fishing would first seek to find other fishing spots in the area, as appears to have occurred with pastoral station campers. If these prove inadequate, then they seek fishing spots in other regions. If other regions prove inadequate, then they may give up the activity and/or the region altogether (depending on which has greater priority—the activity or the region). In the case of station campers, the first stage has been breached for many, with many station campers and local residents feeling inconvenienced by the changes. However, in the case of pastoral station campers at least, it has not yet reached the point where their visitor experience has been unduly diminished. Further, their willingness to return to the region is as high, if not higher, than it has ever been. From this perspective, the social impacts from the expanded sanctuary zones thus far do not seem to have been severe, with fishers ‘weathering’ the management changes despite reasonably high levels of irritation with the new zoning. Whether the inconvenience caused by the sanctuary zones subsides as visitors adapt to, and ultimately accept, the new conditions, remains at current levels or increases as a result of growing camping numbers placing greater pressures on a smaller area remains to be seen—hence the need for continued monitoring.

It is important to keep in mind that the issue of impacts from changes to sanctuary zones is also about impacts on perceptions as much as behaviour. This comes back to the importance of the wilderness experience for visitor segments such as campers. Even the very notion of restrictions is enough to threaten the experience of wilderness camping, which in its normal formulation is antithetical to external regulation. The very notion that certain parts of the waters are off limits, reinforced by visible warning signs, goes against the wilderness mindset. The question is, do campers interpret such changes in terms of a threshold of tolerability, in which the degradation of the traditional concept of wilderness camping reaches a point where they choose to go elsewhere? Or does their concept of what wilderness camping involves undergoes change, with an acceptance of at least some restrictions on behaviour, thereby adapting to the changing management system? The complexity of campers’ attraction to the destination—which does not rely solely on recreational fishing—also needs to be considered, perhaps offering some degree of resilience to changes to particular components of their visitor satisfaction. The project team feels that qualitative research into the experience of camping at Ningaloo may prove insightful for understanding these types of relationships.

More investigation is also required regarding the effect of sanctuary zone changes on other visitor groups, particularly intrastate visitors staying in commercial camping grounds, in motels/hotels, and in holiday rental houses and apartments. It has been assumed by the project team that if pastoral station campers can tolerate the changes without a loss of visitor satisfaction, then the chances are high that other visitor groups will be similarly unaffected. However, this is an assumption, and it is important that other visitor groups are surveyed to determine whether this is indeed the case. Given the paucity of information

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about the characteristics of the other visitor groups, such investigation will be helpful for understanding the Ningaloo visitor market generally.

There are a number of priority areas that the project team has identified for further investigation for monitoring of the impacts from Marine Park management. There is a need to understand more about the recreational activities of different market segments, in particular: caravanners and campers in commercial camping grounds; visitors staying in motels and hotels; and visitors staying in rented flats, houses and apartments. There is also a need to examine a potentially important market segment that is not picked up in TRA surveys—medium-term renters. Anecdotal information suggests that there is an unidentified number of visitors that take out six-month to one-year leases of non-accommodation rental properties in Exmouth for holiday purposes, and therefore are misclassified as residents. On this basis, it would appear that the Exmouth holiday market is larger than what is commonly thought. The presence of long-term residents who have moved to the area for primarily recreational and relaxation purposes, such as retirees, also needs to be thoroughly investigated. Many of these residents, such as retirees currently purchasing properties in the Marina canals area, are undoubtedly keen boat fishers, and therefore may also be sensitive to management decisions relating to the Marine Park.

There is also a need to determine the economic value of activities such as recreational fishing to tourism in the Northern Gascoyne. Such research needs to consider the whole gamut of activities that visitors participate in, for it is clear that few visitors are attracted to just one particular activity. It is also unlikely that activities alone constitute prime reasons for visiting the region, with natural attractions and an ineffable ‘wilderness experience’ being important for many visitors. Any estimates of economic contributions for a particular activity are rather meaningless unless the following aspects are examined: the activities that visitors engage in; the reasons that visitors cite for visiting a region; and the degree to which they would choose not to visit the area if those activities and destination characteristics were not available or present.

Capacity for Monitoring

In order to undertake future monitoring, a number of changes are required to improve the capacity for data collection in the region. These changes have been identified as a result of the difficulties experienced by the project team in obtaining reliable socio-economic data on the region. The innovations are necessary for any meaningful monitoring to take place, whether regarding impacts from management decisions or from any other impacts relating to tourism. The project team has devised five key recommendations in this respect, which reflect general principles of evidence-based planning and decision-making. While these principles are generally well known to State government authorities, the ‘will’ and commitment of agencies to apply them to socio-economic monitoring in the Ningaloo region is substantially lacking. These principles need to be fully embraced before the important task of designing appropriate socio-economic indicators and methods for data collection can be carried out.

Recommendations

Heightened recognition of the importance of research and evaluation in future management policies

Research and evaluation are key stages in the planning process framework. The Carnarvon – Ningaloo Coast Regional Strategy draws attention to the need to put in place an extensive, robust monitoring system for the Ningaloo coast when it states:

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A key initiative of the State Sustainability Strategy is the need for planning to identify indicators of change which can be measured. These measurable indicators monitor whether the principles of sustainability are working for the region (WAPC, 2004:14).

It goes on to state that ‘Sustainability indicators should be developed through the public consultation process to monitor the outcomes of the Strategy’, but says nothing further about the matter.

Improvement of data quality

As outlined in this report, an effective monitoring system is an extensive process that involves inspection of numerous data sources. To understand impacts from management decisions in Parks, it is also necessary to understand impacts from other factors such as accommodation pricing and fuel, so that confounding factors can be identified and distinguished. The accuracy of the assessments is strongly determined by the reliability and validity of the data sources. In the case of regional areas like the Ningaloo coast, the available data sources maintained by agencies are generally inadequate. While there seems to be an interest by planning authorities to undertake such monitoring, it was evident that the State and Commonwealth agencies that are in the best position to monitor changes were not engaging with this process comprehensively. As a result, very little is known about social and economic impacts from human usage of the Marine Park or tourism in the region. Further, even knowledge of environmental impacts seems to be relatively poor. One study by Westera et al (2003) suggested that one fish species in particular, *Lethrinus nebulosus* (commonly known as Emperor), has been depopulated as a result of increasing recreational fishing activity, with comparisons between sanctuary zones and recreational zones indicating significant differences between the size and population of Emperors within the different zones. The study was inconclusive, however, regarding the severity of the threat to the reproductive cycle of Emperor, lacked appropriate baseline data and has not been followed-up by more extensive ecological research. On the matter of inadequate understanding of environmental impacts, the following remarks from the WA branch of the Australian Marine Sciences Association, which was otherwise enthusiastic in its support of the Ningaloo Draft Management Plan, are relevant:

For many species and ecosystems within the NMP it is widely acknowledged that we have only a limited understanding at best of the factors that influence their functioning, and even presence or absence. It is therefore difficult to determine the natural baseline of the Ningaloo system, and extremely difficult to make informed management decisions (AMSA(WA), 2004: 2–3).

The Association recommended that collecting baseline data on environmental conditions should be a priority. The absence of robust data supporting the need for sanctuary zone extensions was an issue identified by RecFishWest, the peak body for recreational fishers in Western Australia, in its submission for public comment on the Management Plan (RecFishWA, 2004). DEC staff assured the project team that the environmental data for Ningaloo available to them was extensive. Even so, it should be noted that much of this data has not been made publicly available or subject to peer review by environmental experts working independently to DEC. It is probable that the concerns raised in some quarters of the community over the need for sanctuary zone extensions could have been greatly alleviated through a stronger and more publicised scientific foundation to the proposal. The same applies to social and economic impacts, which the project team holds demand similar prioritisation to environmental data if true sustainability is being sought for the region.

Capacity for long-term monitoring

The commencement of the multimillion-dollar funded CSIRO Ningaloo Cluster Project in 2006 promises to uncover a wealth of information about human and environmental impacts from management changes in the Marine Park over next few years. However, the research work undertaken in the Cluster Project will be partly dependent on data supplied by agencies in the region, which is currently insufficient in many respects. Further, the regional agencies will need to carry on the task of monitoring well after the Cluster Project is completed. It is therefore essential that key agencies in the region ensure that they have the capacity for long-term socio-economic monitoring, which at present is considerably underdeveloped.

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This is essentially a policy issue, not an issue of sufficient funding and resources, as policies are the basis for the allocation of funding and resources. It is important that the key government agencies responsible for planning and management in the region take seriously the notion of wider social and economic impacts from their decision-making as outlined in Western Australia's State Sustainability Strategy (Government of Western Australia, 2003), with particular attention to monitoring the anticipated effects on local communities and visitors to the region. While the project team were limited in terms of the indicators available for the impact assessment, and therefore were left to pick the best indicators available from a less-than-ideal range, government agencies are in the prime position to formulate an ideal set of socio-economic indicators for long-term tourism monitoring of the Ningaloo coast.

Some steps towards identifying human usage have been undertaken in the Management Plan for Ningaloo Marine Park (CALM, 2005b), but socio-economic performance measures and targets are notably blank in the report, with reporting indicators simply left 'to be developed'. Further, the focus on human usage within the Marine Park fails to acknowledge the socio-economic impacts of the Marine Park on the surrounding region. A much more comprehensive monitoring system is required. It is hoped that CSIRO's Wealth from the Oceans Ningaloo Flagship Program, which commenced in late 2006, may make significant progress towards achieving such a framework. A robust and transparent monitoring system will do much to improve the rationale for decision-making and to elicit support from the community for planning and management decisions.

Promotion of stronger interagency collaboration

Five State and two local government agencies were identified as having a key role in collecting relevant data for monitoring of Ningaloo: Tourism Western Australia; Department of Environment and Conservation; Department of Fisheries; Department of Planning and Infrastructure (including the Ningaloo Sustainable Development Committee and the Pastoral Lands Board); Gascoyne Development Committee; and the two Shires (Exmouth and Carnarvon). The project team felt that there was a low level of data sharing between the various agencies, with collaboration being a somewhat ad hoc affair involving consultation on issues and concerns only when they were perceived to be pressing. This is partly explained by the different agenda of the agencies, but is rooted in a lack of understanding of the interrelational nature of social, economic and environmental changes. As an example, the Department of Fisheries' recreational surveys of the Northern Gascoyne, carried out in 1998–99 (Sumner, Williamson & Malseed, 2002) and currently underway in 2007–08, have in the past only measured fishing effort, not the number of fishers and their demographic details. Consequently, it is not possible to determine from these surveys if the bulk of fishing effort is concentrated in the hands of a relatively small number of recreational fishers or is spread among the many visitors and residents that engage in the activity. Without this information, it is not possible for planning agencies such as WAPC and DEC to make informed decisions relating to visitation and residential activity that may assist in the management of fishing stocks, including delineation of appropriate sanctuary zone boundaries. The notion that an activity like recreational fishing can be sufficiently monitored by a single agency like the Department of Fisheries and that it can be done without reference to processes beyond its sphere of jurisdiction is highly problematic. The lack of a holistic understanding of the processes involved in all aspects of human and environmental impacts in protected areas is the principal cause of this error, and it is an attitude that needs to be changed throughout the rank and file of State-based government agency staff, in accordance with the principles laid down by the State Sustainability Strategy (Government of Western Australia, 2003).

Establishment of closer community partnerships in planning and management

Of even greater concern was the low level of collaboration between the agencies and the tourism operators and accommodation providers in the process of data gathering, particularly the pastoral stations. With the pastoral leases due to expire in 2015, and significant changes already being implemented or negotiated with respect to management of the coastal strip south of Cape Range National Park, some might argue that the pastoral leases are a less important factor in the future management of the coastline. However, at present,

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the pastoral stations continue to be host to most of the camping that occurs south of Cape Range National Park and away from Coral Bay. Consequently, it is important that a suitable consultation framework be established involving pastoral station managers and the principal management agencies in the region for monitoring and managing issues surrounding sanctuary zones and other visitor activities. It is vital that this consultation takes the form of a partnership rather than the imposition of a regulatory regime by government agencies on station managers, in keeping with a community development approach. One of the key achievements of this project was the assistance provided by the pastoral stations in collecting data for the project team, which indicates the level of cooperation possible when a more collaborative rather than directive approach is taken.

Collaboration with the Exmouth Visitor Centre and Carnarvon Visitor Centres is also important for ongoing monitoring of tourism in the region, with the centres possessing a wealth of potentially valuable data sources on visitor bookings that unfortunately are not being systematically and vigorously recorded and collated. The project team was informed that funding for the Exmouth Visitor Centre by the Shire is tightly budgeted, with few staff and resources to contribute to systematic data collection. It is recommended that Tourism Western Australia looks at ways for subsidising research oriented activities at visitor centres in regional areas as a means for improving tourism knowledge and planning in Western Australia.

One major obstacle in effective data-gathering is the problem of data from tourism operators, such as businesses and the pastoral stations, being considered as 'commercial-in-confidence'. The inability of the Australian Tax Office and the Australian Bureau of Statistics to supply business income data on certain periods is a major problem in assessing economic impacts in particular. While the protection of financial information that identifies individual businesses is important for reasons of confidentiality and fair competition, it is also important that such information be made available to researchers, planners and management authorities when it can be done so in such a way that does not violate confidentiality or fair competition. Particularly in the case of the Australian Tax Office, the project team is not convinced that the best efforts are being made to provide such data in a confidential form. More will be said about this problem shortly.

Implementation of compulsory and systematic data collection and reporting procedures

The process of entering data and collating it into a form suitable for monitoring purposes needs to be as automated as possible to minimise user time and user error. It was found that several stakeholders (particularly DEC, the Exmouth Visitor Centre and the pastoral stations) had useful data in their possession or could readily gather such data, but lacked the time, willingness, expertise and/or personnel to collate this data. DEC camping receipts, for example, contained important data on camping numbers and place of origin, but DEC had no mechanism in place whereby the data could be electronically recorded or manually collated. Government agencies need to take a leading role in making such gathering and reporting of data compulsory and ensuring that the data is made available to analysis by researchers and the general public. This will increase the likelihood that such data is interpreted responsibly and applied to planning and management decision-making in a transparent manner. State-based agencies should be fully audited in terms of their capacity for systematic data collection on matters relating to the social and economic impacts of their decisions.

Provision of a central collection and access point

The present situation of multiple agencies, universities, consultancies and individual researchers collecting information about visitation patterns in the Ningaloo Marine Park and not sharing it is not only inefficient but counter-productive, given the costs involved in data collection in remote regions and the problem of visitors being over-surveyed. The project team experienced significant challenges in gaining access to relevant data sets held by various parties, not least government agencies.

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It is the project team's view that Tourism Western Australia is the obvious choice to serve as the central collection agency for visitor data in Western Australia, and the Ningaloo Sustainable Development Office is perhaps best positioned in terms of collating data on the Ningaloo coast for TWA. A collaborative arrangement between Tourism Western Australia and Western Australian universities would ensure that a variety of project teams have access to this centrally collected data. It is highly recommended that DEC regional offices nominate personnel to assist in the collection of visitor information for protected areas in close collaboration with Tourism Western Australia and university researchers, and that such data collation involves not only environmental aspects of park operation, but social and economic aspects as well. It is felt by the project team that greater consideration by regional DEC offices to social and economic matters in protected area management could facilitate greater support for park management and its various programs. The project team does note the valuable work being undertaken by the Park's and Visitor Services Division at DEC to conduct social and economic research.

The project team became aware of an emerging problem with visitors and residents in the region being over-surveyed. This is an inevitable result of project teams (ranging from undergraduate students to consultant firms) independently undertaking surveys—in many cases gathering the same sorts of data. Making data readily available to researchers through a central data agency will greatly assist in reducing this problem.

Process of Monitoring

The project team also has a number of suggestions for how some existing data collection processes can be improved.

DEC aerial surveys

Every five years, aerial surveys should be conducted monthly in order to determine the pattern of camping occupancy over the entire year. In the years in between, the surveys should be carried out on a quarterly basis (January, April, July, October).

Cape Range visitor counts

The current system of metro-counters is an effective means for gathering data on traffic volume. Its use as an indicator for visitor use, however, is questionable. A random survey of visitors entering Cape Range National Park by entry gate staff would answer many questions such as: the rate of utilisation of the park by locals as opposed to travellers; the average number of visits to the park during a traveller's stay in the region; and the intended activities of park visitors. This survey should be carried out at regular intervals throughout the year (ideally in conjunction with the aerial survey) to account for seasonality. The results of such surveys will assist in the meaningful interpretation of metro-counter statistics.

Camping receipts

DEC camping receipts are presently a greatly underutilised data source. Each receipt contains information on the date of camping, the location of campers, the number of people in the camping group (including adults versus children), the vehicle type, the origins of visitors (by virtue of vehicle registration number) and the number of nights stayed. Presently, this information is routinely destroyed without first being electronically recorded. The data from these receipts need to be electronically stored so that it can be properly analysed. Additionally, the receipts should be employed by pastoral station managers as a data source for campers south of Cape Range National Park.

Visitor Centre data

Visitor centres serve as an important agency for accommodation and tour bookings. They record information on the origin of travellers, their length of stay, their level of spending and the number of people in the travelling party. While their bookings data is not necessarily representative of the clientele for the businesses they act as agents for (for example, repeat visitors are probably more likely to book directly with accommodation providers and tour operators rather than through visitor centres), they are an important

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source of data in the absence of direct bookings data. At present, bookings information for the Exmouth Visitors Centre is not systematically stored, due to staffing disruptions and insufficient funding. It is important that this situation is improved so that important demographic and economic information can be made available for monitoring. An attempt to ascertain how representative visitor centre bookings are in terms of the wider visitor market also needs to be undertaken so that bookings data can be reliably interpreted. Such understanding can be acquired through general visitor surveys that seek to determine what percentage of visitors place accommodation and tour bookings through the visitor centres.

Recreational fishing surveys

The Department of Fisheries is currently undertaking its second creel survey for the Gascoyne bio-region, which has been almost ten years in the waiting. The first survey conducted in 1998–99 failed to report fisher numbers or inquire about the origins of fishers, which are essential items of information for assessing the impact of tourism. Another problem is the infrequency of these surveys, which should be undertaken every five years at a minimum.

Business revenue data

The unavailability of tourism business data at the local government authority level is a major problem in assessing the economic contribution of tourism and monitoring economic impacts from management changes. Commercial-in-confidence issues primarily underlie this deficiency. While specific suggestions for addressing this problem are beyond the scope of the present report, it is important that agencies such as the Australian Bureau of Statistics (ABS) and the Australian Tax Office (ATO) work towards providing tourism satellite accounts at the local and regional levels. The ABS relies on direct reporting by accommodation providers of their revenue, but generally does not cover all providers (having a national response rate of between 80–90%) and may be subject to various non-sampling errors such as reporting errors (ABS, 2006). GST data collected by ATO, on the other hand, is comprehensive and less prone to non-sampling errors. While ABS data is vital for understanding specific expenditure categories (such as accommodation fees as opposed to other forms of expenditure) and important non financial data (such as occupancy rates), the publication of ATO data would greatly assist in determining overall revenue levels for accommodation providers and other tourism-related businesses.

Revenue figures, of course, do not provide the full picture when it comes to determining the economic contribution of tourism, with the costs involved in supplying services, the flow-on (or ‘multiplier’) effect to other industries, and other factors discussed in Chapter 2 all being relevant for undertaking this calculation. A discussion of these factors and a methodology for obtaining relevant data is beyond the scope of this report. Suffice to say that it is important that agencies investigate the means for obtaining such information if the impact of management decisions on the local and regional economy is to be properly monitored.

Visitor surveys

There is a need to gain in-depth information on the demographic profile and activity patterns of various visitor segments, such as backpackers, round-trip caravanners, international visitors, hotel/motel stayers, to name just a few. Unfortunately, the data provided by Tourism Research Australia from its international and national visitor surveys are too limited and employ an insufficient sample size to adequately profile visitors to regional areas such as the Ningaloo coast. A comprehensive survey of clients of all accommodation providers in the shires of Exmouth and Carnarvon would be extremely useful in this respect. These surveys should be carried out on a periodic basis (say, every five years in line with the Australian Census of Population and Housing survey) in order to assess any shifts in the visitor market.

Residential surveys

A regular telephone-based residential survey is required that examines residential recreational patterns in the shires of Exmouth and Carnarvon. Such a survey would also be a useful means for determining the number of people utilising rental accommodation for holiday purposes. It is suggested that residential surveys for Exmouth and Carnarvon are carried out every five years in line with the Australian Census of Population and Housing survey.

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Shark Bay control data

It is important that inter-regional comparisons are available for assessing whether changes are local or non-local in nature. For this reason, all data gathering processes should be implemented in the neighbouring Shark Bay region so that localised management impacts can be readily identified through comparative analysis.

Final Word

The shires of Exmouth and Carnarvon are among a growing number of local government areas that are significantly dependent—both economically and socially—upon protected areas that have become major tourism drawcards. It is therefore imperative that management decisions relating to these areas have a sound evidence-base. The implementation of the 2005–15 Management Plan was criticised by some groups, particularly the recreational fishing groups, for, amongst other things, the perceived lack of a sound evidence base, both in terms of ecological impacts from recreational fishing and potential impacts of sanctuary zone changes on tourism and the community (Recfishwest, 2004). The project team confirms that the level of understanding by government agencies regarding social and economic impacts in the Northern Gascoyne is relatively poor. The fact that the 2005–15 Management Plan has left the key indicators for itemised social and economic values curiously blank indicates that there is still some way to go before such an understanding can be achieved. The absence of robust data poses a serious problem for carrying out informed impact assessments of management decisions. This view is consistent with Griffin and Vacaflares (2004:viii) who lament ‘... the lack of consistent, good quality data relating to visitor numbers, profiles, motivations and desired experiences upon which planning, management and, in particular, resource allocation decisions can be based’. This report reinforces their call for more effort into addressing this deficiency so that the appropriateness and transparency of management decisions is improved. While steps to protect the environment should be applauded, they must be undertaken using a sound understanding of impacts across the environmental, social and economic dimensions. In many cases, these different spheres of interest can be catered to without adversely affecting each other. Planning and management authorities need to be pro-active and creative in finding ways that best preserve sustainability across all spheres.

APPENDIX A: 2002 Cape Range Visitor Survey

Amanda Polley, Jeremy Northcote and Susan A. Moore

Introduction

In 2002 Amanda Polley carried out a survey of visitors to Cape Range National Park in order to investigate perceptions concerning protected area management. As part of this survey, a range of visitation data was gathered, which the project team for the current project felt might be useful for understanding the pre-2004 characteristics of recreational fishers in the National Park. However, it was realised that it would be necessary to reaggregate the original data into the relevant visitor segments and activity groups, and then undertake a fresh analysis of the data in order to obtain information relevant to the impact assessment. In collaboration with Amanda Polley and Sue Moore, this task was carried out as a collaborative endeavour for the Ningaloo monitoring project.

Method

In the original survey project carried out by Polley (2002), questionnaires were distributed to visitors in Cape Range National Park over a one month period from 15 June to July 13 2002. Children under the age of 16 years old were not included in accordance with the Department of Environment and Conservation's survey policy. Coastal day-use sites were visited once a day for five to six days per week, with all visitors at a site surveyed while the researchers were there. Time spent surveying varied between sites, with larger sites being surveyed over a longer period (often up to an hour). Campgrounds were surveyed by campground hosts. Smaller campgrounds without hosts were not surveyed because their campers generally left these campgrounds during the day and thus could not be surveyed at their campsite by the researchers. It was assumed that these visitors were often subsequently surveyed at day-use sites during the day. See Polley (2002) for a more detailed discussion of the methodology employed.

The different methods of distribution used for day-use sites and campgrounds means that aggregate results need to be treated with caution. For example, with over half of respondents being campers, there was clearly an overrepresentation of campers in the survey. However, no overall figures for campers and day visitors to Cape Range National Park are available, making it impossible to determine the proportion of each surveyed. As such, the following statistics disaggregate the results of day visitors from campers. The survey had a response rate of 81% with 507 questionnaires completed, by 240 day visitors and 242 campers (with an additional 25 respondents that did not indicate whether they were camping or not).

Overview of Day Visitors

The majority of day visitors to the National Park were from Western Australia. The origins of day visitors are shown below in Table A1.

Table A1 Origins of day visitors

Origins	Percentage (N = 237)
Intrastate	59.9%
Interstate	24.5%
International	15.4%

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The average number of visits to the National Park was 4.4 times (SD = 10.972, N = 144), for an average of 1.7 times per year inclusive of the current year of visit (SD = 6.7).⁶ Most day visitors (73%) had not visited the National Park previously. Of those who had, they averaged 9.0 visits (SD = 15.7), with an average of 3.6 visits per year inclusive of the current year of visit (SD = 13.0). For Perth metropolitan visitors the average was 1.38 times, for regional Western Australian visitors it was 3.9 times, for interstate visitors it was 1.0, and for overseas visitors it was 1.1 times.⁷ When outliers averaging 50 or more visits per year (probably associated with tourist operators) were removed (only one case), day visitors averaged 4.2 visits (SD = 10.8) and 1.2 visits per year (SD = 1.9) inclusive of the current year of visit. The size of their travelling group was 3.9 persons (SD = 3.7). Approximately 10% of day visitors brought a boat with them. For transportation, 39.7% drove in a 2WD vehicle, 45.2% came by 4WD, 12.1% came by bus, and 3.0% came by other transport. In terms of origin, 42.6% came from Perth, 16.0% from regional Western Australia, 1.3% were from the Shire of Exmouth—totalling 60% from Western Australia—while 24.2% were from interstate and 15.6% from overseas. Visitor groups had an average of 3.85 persons (SD = 3.7).

With respect to purpose of visit, respondents were asked to rate the importance of a number of attractions of the National Park. Note that only 3.4% indicated a reason other than those provided as having any importance at all. The ratings of ‘extremely important’ for the set items are provided in Table A2.

Table A2 Percentage of day visitors rating activities as extremely important

Reason	Fishers N = 64	Non-Fishers N = 176	Total N = 240
To view scenery	20.0%	35.1%	31.2%
To be in and enjoy the natural environment	31.7%	44.8%	41.4%
To learn about nature	1.8%	17.6%	13.6%
To enjoy outdoor activities	36.7%	34.1%	34.8%
To spend time with companions	16.1%	32.7%	28.5%
For solitude	9.6%	16.0%	14.4%
For a sense of adventure	14.5%	19.5%	18.2%

There were some differences between reasons rated as extremely important by fishers from non-fishers, with viewing scenery ($\chi^2 = 3.1$, N = 232, $p < 0.05$), learning about nature ($\chi^2 = 8.7$, N = 220, $p < 0.01$), and spending time with companions ($\chi^2 = 5.7$, N = 221, $p < 0.05$) being significantly different. Only enjoying outdoor activities was cited by more fishers than non-fishers.

Just over one-quarter of day visitors (26.7%) to Cape Range National Park engaged in recreational fishing. The breakdown of recreational fishers by origin is shown in Table A3.

⁶ In other words, all visitors ___ including those who had not previously visited the National Park ___ were credited with one annual visit of the park as a means of deriving an indication of how many times they had visited in the previous twelve months. This is, admittedly, a somewhat rudimentary measure, which would have been better served by simply asking respondents how many times they had visited in the previously twelve months, including the present visit.

⁷ The nature of the wording for this question (which asked how many times per year on average do you typically visit the park) required some correction of the responses (with those visiting less than once tending to leave the answer blank). Blank answers were corrected to ‘once’. Ideally, the question should have asked, “how many times have you visited the park (including this visit) in the last twelve months?”

Table A3 Percentage of day visitors participating in recreational fishing

Origins	Percentage	Total Sample
Intrastate	30.3%	142
Interstate	27.6%	58
International	10.8%	37

Although respondents were not asked about boat fishing, it is interesting that of the 9.7% of day visitors who brought a boat with them into the National Park, just over half of these (56.5%) intended to go fishing in the National Park (i.e. 5.5% of day visitors altogether). There are, of course, other boat-based activities that visitors may use a boat for, such as snorkelling, diving and general boating.

The following table (Table A4) indicates the percentage of campers that engage in other activities in the National Park.

Table A4 Participation in activities other than fishing

Activity	Fishers N = 64	Non-Fishers N = 176	Total N = 240
Appreciate nature and scenery	75.0%	85.2%	82.5%
Viewing land-based wildlife	43.8%	60.8%	56.3%
Viewing marine-based wildlife	59.4%	55.7%	56.7%
Photographing	40.6%	58.0%	53.3%
Picnicking	39.1%	42.6%	41.7%
Walking/hiking	53.1%	50.0%	50.8%
4WDing	15.6%	8.5%	10.4%
Swimming	62.5%	56.8%	58.3%
Relaxing	71.9%	73.3%	72.9%
Diving	12.5%	4.0%	6.3%
Snorkelling	62.5%	58.5%	59.6%
Canoeing/kayaking	10.9%	15.9%	14.6%
Boating	23.4%	3.4%	8.8%
Surfing/windsurfing	3.1%	2.3%	2.5%
Whale shark swimming	7.8%	4.5%	5.4%
Manta ray swimming	4.7%	2.3%	2.9%
Tour	7.8%	17.0%	14.6%
Other	1.6%	2.3%	2.1%

Day fishers differed from non-fishing day visitors in that they were significantly more likely to have visited previously, to bring a boat with them, and to drive by 4WD. This fits the typical fisher profile, and is in contrast to those day visitors who tour the National Park by 2WD and keep to the main surfaced road or the well-maintained tracks to the beach areas. It is probable that some of these day fishers were Exmouth locals, while others were probably staying in Exmouth accommodation, such as the caravan parks. Day fishers were less likely to engage in land-based wildlife viewing and photography than non-fishers. They were similar, however, in terms of age group, travelling party, engaging in activities of marine-based wildlife viewing, picnicking, walking/hiking, swimming, relaxing, snorkelling, and canoeing/kayaking.

Overview of Campers

In terms of origins, 53.1% of campers were from intrastate, 31.4% were from interstate, and 15.5% were from overseas (N = 239). Two thirds of campers (66.1%) were first time visitors. There was a strong association between being from overseas or interstate and being a first-time visitor ($\chi^2 = 43.8$, N = 236, $p < 0.01$). The average number of visits for campers who were repeat visitors to the Park was 10.7 times (SD = 28.4, N = 79), but the median number of visits was 3 times. On average, campers who had visited the park before visited 2.8 times each year inclusive of the current year of visit (SD = 10.3). The statistics are skewed somewhat by a couple of outliers, which might correspond to tour operators who were included within the survey. When two cases are removed (of 50 or more average visits per year), repeat campers visited the park an average of 1.2 times per year, inclusive of the current year of visit (SD = 0.8, N = 78).

The estimated length of stay for all campers is shown below in Table A5.

Table A5 Length of stay for campers

Length of Stay (nights)	Percentage
1	7.3%
2–5	55.6%
6–10	15.8%
11–20	12.4%
20 or more	9.0%

Those from Perth tended to camp longer than those from elsewhere, with one-third (33.7%) intending to camp longer than 10 days, as opposed to 27% from regional WA, 14.6% from interstate, and 4% from overseas. The average group size for travelling parties was 3.5 (SD = 3.0). Those from Perth tended to travel in groups with a mean of 4.2 persons, similar to those from regional WA (a mean of 4 persons). However, those from interstate tended to travel in groups of 2.7 persons, similar to those from overseas (2.5 persons). This reflects the fact that larger groups of relatives and friends are more likely to travel together over shorter distances.

Activities

A total of 59.5% of campers engaged in recreational fishing on their trip, with 64.6% of intrastate campers (N = 127), 70.7% of interstate visitors (N = 75), and 21.6% of overseas visitors (N = 37) participating. Activities other than fishing are shown in Table A6.

Table A6 Activities other than fishing participated in by campers

Activity	Fishing Campers N = 144	Non-Fishing Campers N = 98	Total N = 242
Appreciate nature and scenery	88.2%	88.8%	88.4%
Viewing land-based wildlife	70.1%	78.4%	73.4%
Viewing marine-based wildlife	71.5%	78.6%	74.4%
Photographing	62.5%	75.5%	67.8%
Picnicking	38.2%	43.9%	40.5%
Walking/hiking	66.7%	80.6%	72.3%
4WDing	22.2%	13.3%	18.6%
Swimming	83.3%	83.7%	83.5%
Relaxing	91.0%	88.8%	90.1%
Diving	11.8%	8.2%	10.3%
Snorkelling	75.0%	76.5%	75.6%
Canoeing/kayaking	5.6%	5.1%	5.4%
Boating	27.8%	5.1%	18.6%
Surfing/windsurfing	10.4%	7.1%	9.1%
Whale shark swimming	8.3%	10.2%	9.1%
Manta ray swimming	3.5%	7.1%	5.0%
Tour	6.9%	10.2%	8.3%
Other	4.9%	3.1%	4.1%

Campers were more likely ($p < 0.01$) to engage in these activities than non-campers, of whom 26.7% fished, 10.4% went 4WDing and 50.8% went walking/hiking. While these activities are not in themselves necessarily damaging to the environment, they do place certain environmental pressures on the surrounds that, if not properly managed, can lead to damage. The only activity that campers engaged in less than day visitors was canoeing/kayaking (most of whom were surveyed at the Ningaloo Reef Resort, which operates a sea kayaking experience), in which 5.4% participated as opposed to 14.6% of day visitors. Campers were slightly less likely than day visitors to go on tours ($\chi^2 = 4.76$, $N = 482$, $p < 0.05$), with 8.3% of campers indicating that they did so, in contrast to 14.6% of day visitors. Campers were more appreciative of wildlife in the Park, both terrestrial (73.4%) and marine (74.4%), which is significantly ($p < 0.01$) higher than day visitors (56.3% for terrestrial wildlife and 56.7% for marine wildlife). They also significantly ($p < 0.01$) engage more in photography (67.8% as opposed to 53.3% for day visitors), swimming (83.5% as opposed to 58.3%), snorkelling (75.6% as opposed to 59.6%), boating (18.6% as opposed to 8.8%), and surfing/windsurfing (9.1% as opposed to 2.5%).

In terms of visiting the National Park, respondents were asked to rate a predefined list of reasons provided by the survey team using a Likert scale from 'not important at all' to 'extremely important'. The proportion of respondents who cited various reasons as extremely important is provided opposite in TableA7.

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Table A7 Reasons cited as extremely important for visit by visitors

Reason	Day Visitors	Campers
To view scenery	31.2%	38.0%
To be in and enjoy the natural environment	41.4%	61.3%
To learn about nature	13.6%	17.7%
To enjoy outdoor activities	34.8%	47.4%
To spend time with companions	28.5%	36.9%
For solitude	14.4%	21.4%
For a sense of adventure	18.2%	19.3%

Day visitors were less likely to cite the natural environment ($\chi^2 = 18.5$, $N = 467$, $p < 0.01$), outdoor activities ($\chi^2 = 7.3$, $N = 452$, $p < 0.01$), companionship ($\chi^2 = 3.6$, $N = 454$, $p < 0.05$), and solitude ($\chi^2 = 3.6$, $N = 426$, $p < 0.05$) as extremely important for their visit when compared with campers.

An important point is that most campers had multiple reasons that they rated as extremely important for their visit, as shown in TableA8.

Table A8 Number of reasons cited as extremely important for visit

No. of Reasons	Camping Fishers N = 144	Camping Non-Fishers N = 98	Campers Total N = 236	Day Fishers N = 64	Day Non-Fishers N = 176	Day Visitors Total N = 240
0	24.5%	21.6%	23.3%	45.0%	35.1%	37.7%
1	15.1%	13.4%	14.4%	21.7%	20.5%	20.8%
2	21.6%	22.7%	22.0%	11.7%	14.6%	13.9%
3	17.3%	14.4%	16.1%	11.7%	9.9%	10.4%
4	8.6%	8.2%	8.5%	6.7%	4.1%	4.8%
5	4.3%	6.2%	5.1%	0.0%	7.0%	5.2%
6	2.2%	7.2%	4.2%	3.3%	4.1%	3.9%
7	6.5%	6.2%	6.4%	0.0%	4.7%	3.5%

Some two-thirds (62.2%) of campers rated more than one reason as extremely important for visiting Cape Range, with an average of 2.4 reasons per person ($N = 233$, $SD = 2.0$), and no significant difference between fishers and non-fishers. In contrast, only 41.7% of day visitors rated more than one reason as extremely important, with an average of 1.4 reasons per person ($N = 231$, $SD = 0.5$), and no significant difference between fishers and non-fishers. Hence, there is a significant difference between campers and non-campers in terms of providing multiple reasons as being extremely important for visiting the National Park ($F = 20.9$, $df = 1,465$, $p < 0.01$). It would seem that campers that visit the National Park tend to have more complex reasons for their visit, which perhaps relates to the nature of the camping visit involving appreciation of the wilderness experience on many levels. Campers also tend to have stronger reasons for their visit, with less than one-quarter (23.3%) without at least one extremely important reason for their visit. This perhaps relates to the degree of passion that is required for people to choose to camp in the wilderness, in contrast to day visitors who have not embraced the wilderness experience to the same degree.

Environmental perceptions

There was no significant differences ($p > 0.05$) between campers and day visitors in terms of the importance attached to environmental factors such as the presence of road kills (important for 26.6% of campers and 31% of day visitors), condition of facilities (important for 53.4% of campers and 55.3% of day visitors), presence of wildlife (important for 75.6% of campers and 70.7% of day visitors), level of noise

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(important for 76.2% of campers and 70.5% of day visitors), the presence of litter (important for 91.2% of campers and 93.2% for day visitors), and disposal of human faecal waste (important for 85.8% of campers and 91.7% of day visitors). Neither were campers' levels of acceptance for environmental damage in the form of erosion, vegetation loss, pieces of litter and number of roadkills significantly different from day visitors. Moore and Polley (2007) suggest that these similarities may be due to 'anchoring', where visitors base their preferences on existing conditions.

Camping Fishers

Of the 242 campers surveyed, some 60% engaged in recreational fishing on their trip. Fishing campers were more likely to camp longer than non-fishing campers, with 45.5% intending to stay for six nights or more, as opposed to less than a quarter (24.3%) of non-fishing campers. There was no significant difference to non-fishing campers in this respect based on place of usual residence. The profile of campers that engaged in recreational fishing were similar to non-fishing campers, in terms of the number of previous visits to the park, size of travelling party, age, and other activities engaged in (with the exception of boating which was more popular among fishing campers, and photography, which was more popular among non-fishers). Fishing campers differed from non-fishing campers, however, in terms of being significantly ($p < 0.05$) more likely to bring a boat with them, to travel by 4WD, to come from interstate, and to be male. Respondents were not specifically asked if they engaged in boat fishing as opposed to shore fishing. However, it is interesting to note that of the 17.8% of campers who brought a boat with them into the National Park, 86% intended to go fishing (15.3% altogether).

Fishing campers were similar to day fishers in terms of previous visitation frequency, type of travelling party, towing a boat, vehicle, age, gender, and origin. The former differed from the latter, however, in terms of being more likely ($p < 0.05$) to engage in activities such as appreciating nature, land-based wildlife, photography, walking/hiking, swimming, relaxing, and snorkelling. This probably reflects the longer length of stay of campers in the National Park, where there is sufficient time to engage in a range of other nature-based activities.

In terms of purpose for visit, most fishing campers (58.7%) cited enjoyment of the natural environment as extremely important. The level of agreement with other reasons seen as extremely important is shown in Table A9.

Table A9 Reasons cited as extremely important for visit by campers

Reason	Fishing Campers N = 144	Non-Fishing Campers N = 98	Total (% surveyed) N = 242
To view scenery	33.6%	44.3%	38.0%
To be in and enjoy the natural environment	58.7%	64.9%	61.3%
To learn about nature	15.4%	21.1%	17.7%
To enjoy outdoor activities	48.1%	46.2%	47.4%
To spend time with companions	36.0%	38.3%	36.9%
For solitude	19.9%	23.9%	21.4%
For a sense of adventure	16.9%	22.8%	19.3%

The difference between fishing and non-fishing campers was not statistically significant on any of these measures, indicating that the reasons that people who come to Cape Range National Park to camp are not significantly different depending on whether or not they fish. However, there were several differences between camping and non-camping fishers, with camping fishers more likely to cite: being in and enjoying the natural environment as extremely important for their visit ($\chi^2 = 12.2$, $N = 198$, $p < 0.01$) and spending

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time with companions ($\chi^2 = 7.5$, $N = 195$, $p < 0.01$). These were among the factors mentioned earlier in terms of differences between campers and non-campers.

Conclusion

The analysis of the 2002 Cape Range visitor survey indicates that there are important differences between campers and day visitors, with the passion and complexity of campers reasons for visiting the National Park being greater than day visitors, and their participation in various activities being higher. Importantly, 60% of campers engage in recreational fishing as opposed to approximately 30% of day visitors. Because the profile of fishing campers did not differ greatly from non-fishing campers, this indicates that the differences between visitors related more to whether they were camping or not. This suggests that it might be more relevant to talk in terms of campers and non-campers than fishers and non-fishers when it comes to understanding the profile of visitors to Cape Range National Park.

APPENDIX B: 2002–03 Pastoral Station Survey for the Ningaloo Coast

David Galloway and Jeremy Northcote

Introduction

David Galloway undertook a survey of campers staying on pastoral station properties along the coastline to the south of the National Park, inquiring about similar issues to Polley (2002) concerning attitudes and perceptions towards site management and acquiring a range of data concerning visitor characteristics. The project team saw an opportunity to reconstruct a pre-2004 profile of pastoral station campers to complement the reconstruction of Cape Range fishers. Consequently, David Galloway was approached to collaborate in a re-analysis of the original data for the purposes of the current project.

Method

The survey was conducted by the Ningaloo Reef Outback Coast Association to gather information about visitors in the Gnaraloo, Warroora, Cardabia and Ningaloo Stations. The period that this survey covers is from July 2002 to July 2003. A total of 195 surveys were collected.

Survey forms were passed out to campers who were staying one night or longer on the station (i.e not to day visitors) by the caretakers on each station at each of the major locations used for camping. The caretakers then collected the surveys.

Of the respondents, 42% were male and 55% were female. The gender imbalance probably represents a response bias rather than an actual demographic pattern, as it is unlikely that females outnumber males. It would seem that females were more likely to answer the surveys in contrast to their male partners.

General Overview of Campers

The majority of campers (89.9%) were from Western Australia, with 50% from Perth, 17.3% from the South West, 11.9% from Great Southern, 2.4% from the Goldfields, 2.4% from Central/Murchison, and 6% from the North West (hence 39.9% from regional Western Australia altogether). Only 5.4% were from interstate, with an additional 3% having no fixed address and 1.8% being from overseas. This is in strong contrast to those staying in the National Park, where, according to Polley, Northcote and Moore (Appendix A), 38.9% were from Perth, 18.3% from regional Western Australia, 27.7% from interstate, 15.1% from overseas. The higher preponderance of intrastate visitors perhaps reflects the better familiarity that these visitors have with the region (the majority being repeat visitors), with those travelling from interstate and overseas tending to be less aware of station camps or uncertain of their location and conditions.

In terms of age, 1.8% of station campers were between 15-24 years, 18.3% were between 25-39 years, 38.5% were between 40-59 years, 30.2% were between 60-69 years, 9.5% were between 70-79 years, with 0.6% less than 15 and 1.2% aged 80 years or more. Note that with children, it is likely that parents would have answered on their behalf, so their low representation in the survey is not a true reflection of their presence. This is based on the finding that families comprised 28.6% of campers. Otherwise, most campers were couples (44.6%), with friends comprising 20.8%, and 5.4% camping alone. Families had an average of 4.8 persons in their travelling group, and friends had an average of 5.7 persons in their travelling group. With approximately 28% of station campers staying as a family with an average of 4.8 persons in their travel group, and 58% of family groups being children (assuming 2.8 children per family), we can assume

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(as a very gross estimate) that approximately 16% of all campers are children. Interstate campers tended to travel as couples (77.8%) more so than campers from other destinations. Those travelling with friends were generally from Western Australia. An average of 3.78 persons comprised each travelling party. Based on usual length of stay expressed by those who have visited previously, the number in the travelling party varied according to the type of travelling group, although the difference was not significant based on ANOVA ($F = 1.53$, $df = 4,121$, $p = 0.20$). The average length of stay for each type of travelling group is provided below in Table B1.

Table B1 Average length of stay for travelling groups

Travelling group	Mean	N	Std. Deviation
Family	42.82	33	57.397
Couple	50.79	62	40.605
Friends	28.35	23	26.291
Individual	69.57	7	76.755
Other	60.00	1	
Total	45.72	126	46.437

Very few campers journeyed by 2WD (1.2%), hire car (2.9%) or campervan (4.1%), with most travelling by 4WD alone (34.1%) or a vehicle (most likely a 4WD, although this was not checked) with a caravan (46.5%) or camper trailer (9.4%). A slight majority of campers (56.5%) brought along a boat with them. The prevalence of differently sized boats is shown below in Table B2, with the average horsepower of the motor for each size class shown next to it.

Table B2 Boat length and average motor horsepower

Boat length (metres)	Average horsepower	Percentage (N=86)
3.0–3.9m	13 hp (N = 53, SD = 5.3)	67.4%
4.0–4.9m	26 hp (N = 19, SD = 11.5)	23.3%
5.0–5.9m	58 hp (N = 4, SD = 32.0)	4.7%
6.0–6.9m	81 hp (N = 4, SD = 65.0)	4.7%

Of those with a boat, two-thirds of campers (67.4%) had a small boat. This is considerably smaller than the national average for boat owning recreational fishers (Henry & Lyle, 2003:54), where only 15% possessed boats under four metres, 70% possessed boats between four and five metres (in contrast to 28% of Ningaloo boaters), and 13% with boats six metres or more in length (in contrast to 4.7% of Ningaloo boaters).

At the time of the survey, campers had spent an average of 64.7 days away from home, 40.1 days in the Gascoyne, with 35.9 of those days on the station. While there seemed to be some confusion over precisely what the Gascoyne region encompassed, the result does indicate that some people at least stay at other destinations in the region (Carnarvon being one place frequently mentioned). In terms of days away from home, there was a significant difference between groups ($F = 2.3$, $df = 52,102$, $p < 0.01$) based on how far away from the area their usual place of residence was, with those from the Central and North-West being away on average 9.1 days, those from Perth being away on average 46.3 days, those from southern regions (including the South-West, Great Southern and Goldfields) being away on average 72.9 days, and those from interstate being away on average 229.3 days. In terms of the period spent on the station (up until the day of the survey), there were no notable variations in terms of origin, although those from the Central and

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North-West had stayed a much shorter period (although the result was not statistically significant using ANOVA).

Repeat stayers indicated that they spent on average 45.7 days on the station (SD = 46.4), with 59.5% staying longer than 22 days. This agrees with the findings from a survey conducted by Remote Research (2002), which estimated the average length of stay of station campers to be 47 days, with 45% of campers staying longer than 22 days.

Most campers had stayed on the stations previously (80.6%), and there was no significant difference in terms of origin on this item. Campers indicated that they visited 1.1 times per year inclusive of the current year of visit (SD = 0.25), and had visited an average of 5.5 times in the last ten years (SD = 3.7), although there seems to have been some confusion over whether to count their current visit as part of this figure (an average of six visits altogether—including the present visit—is probably a more accurate figure).⁸ Most campers (91.7%) indicated that they intended to visit the stations again in the future.

Recreational Fishers

Campers were asked to rate the importance of fishing to the enjoyment of their visit. As Table B3 demonstrates below, 19.5% rated fishing as quite important and 60.4% rated it as extremely important.

Table B3 Importance of fishing

Rating	Agreement
Not important	7.3%
Less important	0.6%
Neutral	12.2%
Quite important	19.5%
Extremely important	60.4%

Given the manner in which the question was asked, it is not possible to definitively establish the number of station campers who engage in recreational fishing. For example, someone who answers that fishing is less important might still fish. On the other hand, we can assume that those who answer that fishing is quite important or extremely important most certainly do engage in recreational fishing. A lower limit based on these figures, then, is that at least 80% of station campers fish, but the true figure is probably considerably higher than this.

The importance of fishing is consistent with the role that the pastoral station camping areas have served for the recreational fishing visitor market in the last twenty years, where camping rough and being self-reliant (including subsistence through cooking caught fish) is an intrinsic aspect of the 'wilderness experience'. It should be noted, however, that visitors rated an array of activities as important, as shown in Table B4.

⁸ All visitors—including those who had not previously visited the National Park—were credited with one annual visit of the park as a means of deriving an indication of how many times they had visited in the previous twelve months (which was a somewhat rudimentary measure in the absence of a question that simply asked respondents how many times they had visited in the previously twelve months).

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Table B4 Importance attached to activities during stay

Activity	Somewhat Important	Extremely Important	Total Importance
1 Fishing	19.5%	60.4%	79.9%
2 Boating	17.5%	46.2%	63.6%
3 Snorkelling	16.9%	33.8%	50.7%
4 Scuba diving	5.9%	5.9%	11.8%
5 Swimming	15.3%	59.3%	74.7%
6 Windsurfing	1.7%	5.2%	6.9%
7 Surfing	5.9%	15.3%	21.2%
8 Walking	31.2%	39.6%	70.8%
9 Wildlife watching	25.9%	44.1%	69.9%
10 Off road driving	10.6%	15.9%	26.5%
11 Organised tours	4.0%	0.8%	0.8%
12 Hiking	7.1%	13.4%	20.5%
13 Native plants and animals	26.4%	56.4%	82.9%
14 Cultural values	13.6%	30.4%	44.0%
15 Unique ecosystems	23.8%	51.5%	75.4%
16 Education	15.3%	25.4%	40.7%
17 Spiritual inspiration	7.3%	20.2%	27.4%
18 Being with others	21.8%	33.8%	55.6%
19 Scenic beauty	14.9%	79.2%	94.2%
20 Relaxation	13.4%	85.4%	98.7%
21 Risk taking	7.2%	9.6%	16.8%
22 Physical exercise	32.8%	31.4%	64.2%
23 Adventure	27.9%	22.1%	50.0%
24 Family activities	16.8%	48.9%	65.6%
25 Climate	20.9%	70.9%	91.9%
26 Pastoral station activities	5.5%	17.3%	22.8%

Compared to those who rated fishing as less important, those rating fishing as extremely important were more likely to rate as extremely important: boating ($\chi^2 = 63.9$, $N = 143$, $p < 0.01$), snorkelling ($\chi^2 = 11.7$, $N = 133$, $p < 0.01$), swimming ($\chi^2 = 6.1$, $N = 147$, $p < 0.05$), walking ($\chi^2 = 6.9$, $N = 150$, $p < 0.01$), wildlife viewing ($\chi^2 = 5.1$, $N = 140$, $p < 0.05$), offroading ($\chi^2 = 9.3$, $N = 130$, $p < 0.01$), and hiking ($\chi^2 = 5.9$, $N = 127$, $p < 0.05$). The former group's rating of these activities as extremely important was quite high for some activities, particularly boating (75.3%), swimming (67.1%), wildlife viewing (51.9%), walking (48.3%), and snorkelling (45.3%).

In terms of activities (items 1–12), visitors on average rated 2.9 activities as extremely important to enjoying their visit ($N = 169$, $SD = 1.97$). The frequency of reasons provided by campers is provided below in Table B5.

Table B5 Number of reasons rated as extremely important during stay

No. of Reasons	Percentage
0	12.4%
1	17.2%
2	16.0%
3	15.4%
4	15.4%
5	13.6%
6	7.1%
7	1.8%
8	1.2%

Those who rated fishing as extremely important significantly rated a higher number ($F = 83.7$, $df = 1,161$, $p < 0.01$) of other activities as important (mean = 3.8, $SD = 1.62$) compared to those who did not rate fishing as extremely important (mean = 1.5, $SD = 1.52$). In total, 94.9% of those rating fishing as extremely important rated at least one other activity as also extremely important. It would seem that based on these results those who are keen fishers are less single-minded in their activities than other campers.

For the non-activity items, some of these match up with those surveyed by Polley (Appendix A) for reasons cited as extremely important for visiting Cape Range National Park (although the slightly different wording of the questions should be noted). The 25.4% of those who rated education as extremely important to their experience corresponds to 17.7% of Cape Range campers. The one-third (33.8%) who rated being with others as extremely important corresponds to 36.9% of Cape Range campers. The 22.1% who rated adventure as extremely important corresponds to 19.3% of Cape Range campers. However, the 79.2% who rated viewing scenery as extremely important corresponds to only 38% of Cape Range campers.

Attitudes to the Environment

The survey found that most station campers appreciated their surrounding environment, with several natural features viewed as important. Of particular importance were the beaches (97.6%), reef (94.6%), wilderness (69.3%), landscape (67.5%), ranges etc. (64.5%), wide open paddocks (51.8%), and biodiversity (51.2%). Campers attached a great deal of importance to the beaches (93.5%), being able to stay long periods (84.6%), secluded campsites (83.4%), self-reliant camping (82.2%), and solitude (71.6%). In contrast to the 1998–99 survey by Sumner, Williamson and Malseed (2002), which inquired about actual catches (see notes below), the 2002 survey focused on ideal catch limits. The survey found that 51.8% believed that the bag limit should be set at the amount of fish that would ensure a daily feed, while 47% felt that the bag limit was acceptable. A minority (1.2%) felt that no fish should be caught.

Conclusion

The analysis of the 2002 survey data reveals that recreational fishing is more widely rated as important to pastoral station campers than any other activity. However, the findings also reveal that campers—and fishers in particular—tend to rate several activities as important to their stay. This indicates the complexity of the wilderness experience that characterises camping along the Ningaloo coast, which does not revolve around recreational fishing alone. While the nature of the questions were somewhat different from those employed in the 2002 Cape Range National Park survey (meaning that direct comparisons between the findings of the two surveys is somewhat difficult), there is a similar picture that emerges regarding campers' passionate and multi-dimensional engagement with the surrounding environment.

APPENDIX C: Time Series Analysis of Selected Indicators for the Ningaloo Coast

Jim Cross, Petra Roberts and Jeremy Northcote

Introduction

A number of data sets were made available by the project team for analysis by researchers at Edith Cowan University with expertise in time-series analysis. Some of the factors included visitor counts and turnover for the Cape Range camping grounds and visitors counts for Exmouth and Monkey Mia. Fuel prices were also considered in the analysis as a variable of interest.

Methodology

A number of time series methods were used to analyse the data. Firstly, an overview of the data was given by way of time plots. Time plots are important to obtain simple descriptive measures of the main properties of the series such as regular seasonal effect and trend. Since the data sets showed a high level of seasonality, differencing and the Winters method could be used to smooth the data so that any trend may become visible.

The Holt-Winters method (Chatfield & Yar, 1988) was used to search for an appropriate time series model. After seasonality and trend had been removed and the data made stationary, the level of cross correlation between data sets could be examined to see if one data set can explain the variation in another data set. Residuals from the various methods were checked for any abnormalities which may confirm a change in trend.

Data Set

A raw data file containing a number of data sets for various locations in the Ningaloo region was provided. Most of the data was collected by DEC. All data sets contained monthly data. Cape Range camping turnover visitor counts from the Exmouth Visitor Centre provided the most useful data by length of time period and consistency. The visitor count data for Monkey Mia was also helpful and was used as a comparison to the Cape Range and Exmouth visitor counts. Unfortunately, data for the caravan parks and access to national parks in the region contained large periods of missing data. The Cape Range camping turnover data set provided values from July 1999 to June 2006, visitor counts for Exmouth contained data from January 2003 to July 2006 and the visitor counts for Monkey Mia provided data from June 2000 to August 2006. However, anomalies in the way that the camping turnover data is collected and problems in translating financial data to visitation data meant that less emphasis was placed on this particular data set than the other data sets. International visitors to Australia and Australians departing for overseas were also included, but the data was considered to contain too many global tourism effects and was not sufficiently specific to the Ningaloo region and therefore was not used.

Fuel prices have steadily increased and are believed by some to impact on visitor counts to the region due to the large distances in travel required. Average monthly fuel prices for both diesel and petrol from the Perth metropolitan area are given over a five year period and compared to visitor counts.

Access to another data file was given which included quarterly data sets for the shires of Exmouth, Canarvon and Shark Bay. The data was collected by Tourism Research Australia and provided visitor counts and visitor night counts for international visitors to the three locations. Overnight trips and visitor

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night counts were given for interstate and intrastate visitors. Because of insufficient sample sizes, this data was not included in the analysis.

Time Series Charts

Seasonality

The following time plots are a graphical representation of DEC camping turnover for Cape Range National Park. These time plots are used to highlight important features such as regular seasonal effect and trend.

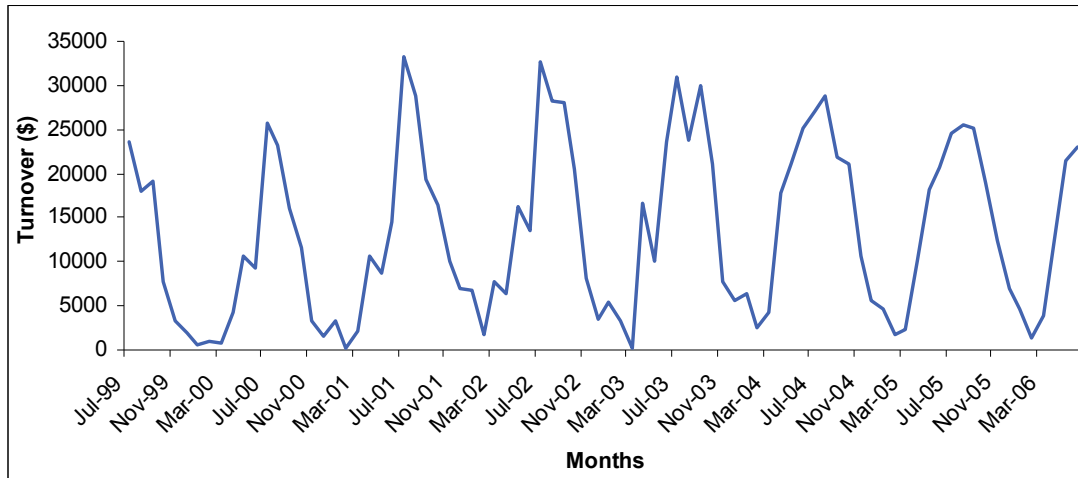


Figure C1 DEC Cape Range camping turnover in dollars from July 1999 to June 2006

The Cape Range turnover shown in Figure C1 clearly displays a strong regular seasonal effect with the peak turnover being in the months from July to September and very little turnover in the months January to April. Looking at the highest annual turnover data points there appears to be a slight decreasing trend after the 2001 peak period.

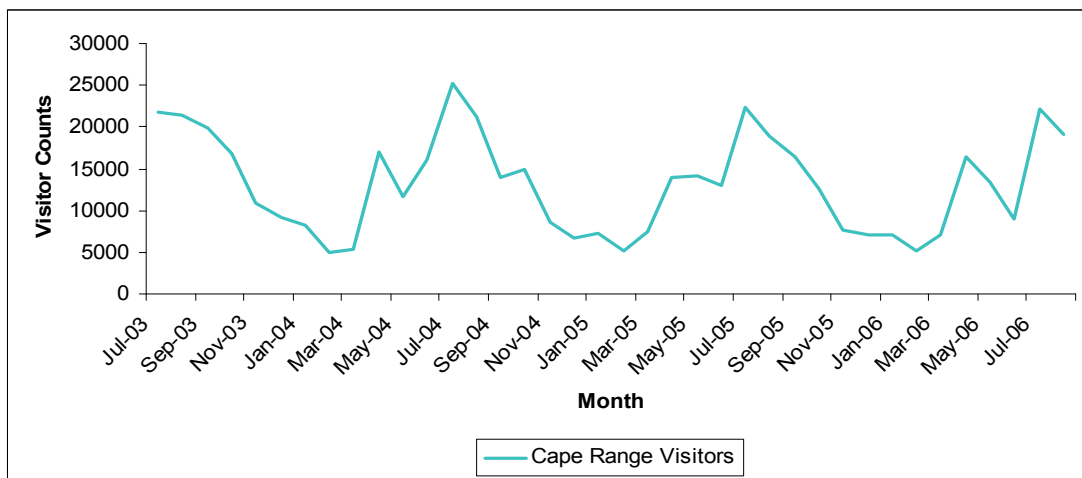


Figure C2 DEC Cape Range visitor data displays a strong seasonal component

As with the Cape Range camping turnover data, the visitor counts for Cape Range, shown in Figure C2, displays a strong seasonal pattern with peak periods occurring in July.

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It is obvious from these data plots that before we can look at any trend we first need to deal with the seasonal component. The seasonal component can be removed using a number of methods and this is explored below. Comparisons to other data sets were also made after this data had been deseasonalised.

One of these data sets was from Monkey Mia. Monkey Mia is a holiday destination in the North West of Western Australia to the south of Exmouth. Monthly visitor numbers for Monkey Mia are available from June 2000 to August 2006. This data displays a strong 12 month seasonal pattern similar to the DEC Cape Range visitor data. We can compare visitor numbers for both regions to see whether there is any difference in trend. If we find that the trend is similar in both sets of data then we can assume that there are other reasons for the decline in visitor numbers not specific to the Exmouth region. Alternatively, a difference in trend would point to local factors.

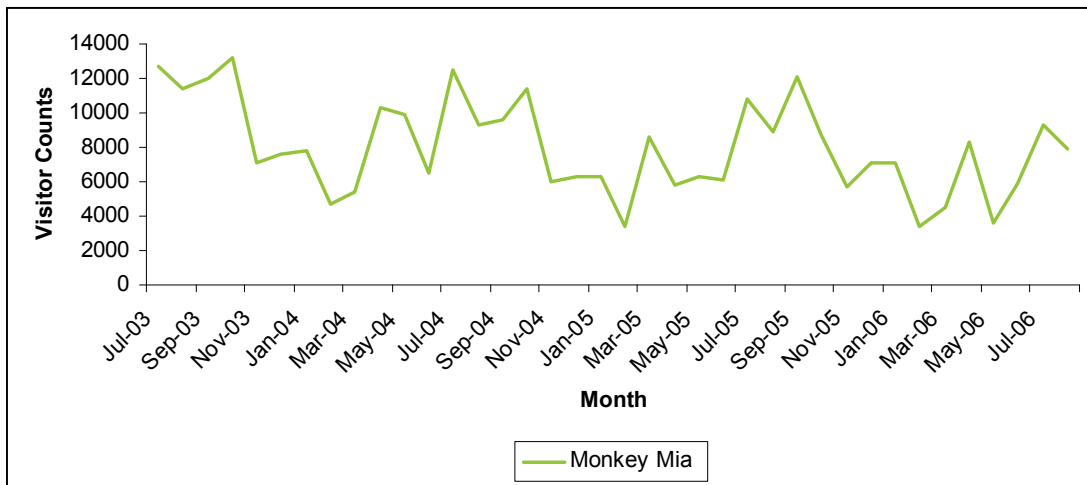


Figure C3 Time series plot of visitor counts at Monkey Mia

The time series plot for visitor numbers for Monkey Mia, provided in Figure C3, shows that there is a seasonal component. The Monkey Mia data have fewer numbers of visitors compared to Cape Range but still displays a similar seasonal annual pattern as Cape Range. It could be suggested that the multiple peaks in the Monkey Mia data coincide with the Western Australian school holiday periods in July and October. School holidays may have a greater effect on Monkey Mia visitors for a couple of reasons. One could be that distance is an issue, with Monkey Mia being slightly closer to Perth than Cape Range and another factor is the seasonal nature of the whale shark migration at Cape Range compared to the all year presence of dolphins at Monkey Mia. Another consideration is that Monkey Mia receives a higher visitation rate from international travellers (around 34%) than Cape Range (around 17%), with the peak season for international visitors being the summer off-season, thereby balancing out (to some extent at least) the strong domestic tourism market between April to September (see Smith & Newsome, 2005). Since the strength of the seasonal component masks any other factors, it was important to deseasonalise the data to see if such factors as trend exist.

Analysis

A number of time series methods can be used to remove the seasonal component from the data. Because the data displays a strong annual pattern, a 12th difference can be used and a cross correlation performed on the deseasonalised data. The Holt-Winters method (Chatfield & Yar, 1988) was also used for trend analysis.

DEC Cape Range camping turnover data

The Cape Range camping turnover data was considered first. As noted earlier, there is a difficulty in translating camping turnover in terms of visitation rates, due to the fact the data is a combination of two variables—visitor numbers and length of stay. Care needs to be taken when interpreting the results.

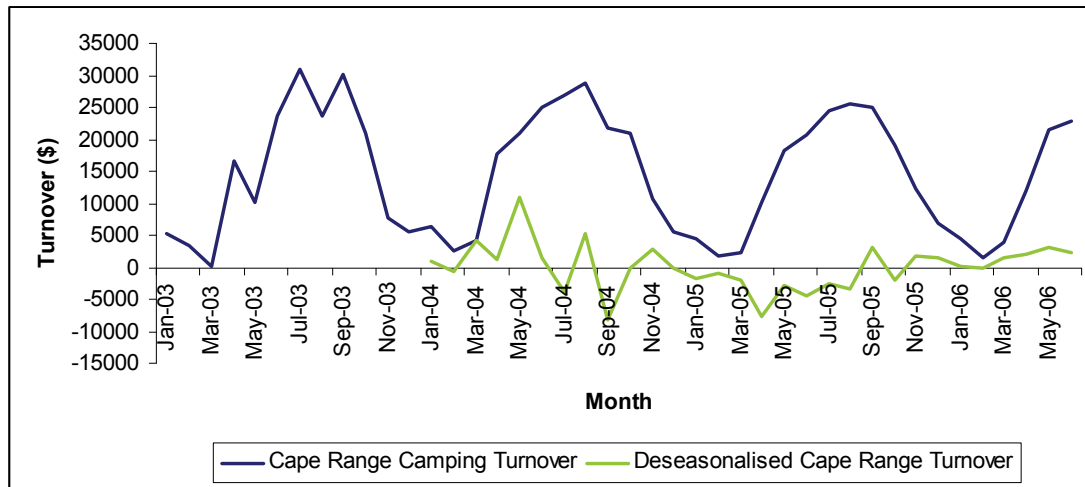


Figure C4 Deseasonalised data for Cape Range camping turnover

As previously stated the strong seasonal component in the data needs to be removed. The 12-month difference is taken and the results shown in Figure C4 clearly show that no seasonality remains in the data. This data can now be tested to see if any trend exists.

The Autocorrelation function (ACF) and the Partial Autocorrelation Function (PACF) are calculated using the deseasonalised data, shown below in Figure C5. The results at the 5% significance level give a significant correlation at lag 2 and at lag 12 for both the ACF and PACF (below). However it could be argued that the deseasonalised data is a purely random process with no indication of change in trend.

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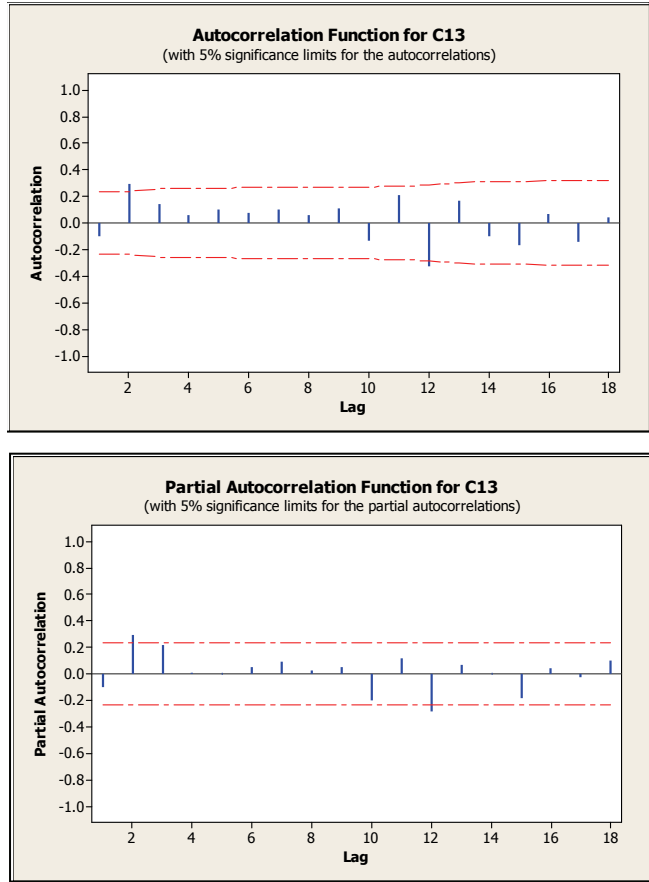


Figure C5 ACF and PACF of the deseasonalised Cape Range camping turnover data

The trend was also analysed using Winters method. A 12-month seasonal component was added to the model. The trend as calculated by the Winters method is shown in Figure C6. Although fluctuations exist overall, there does not appear to be a change in the trend which has remained relatively stable since the middle of 2001.

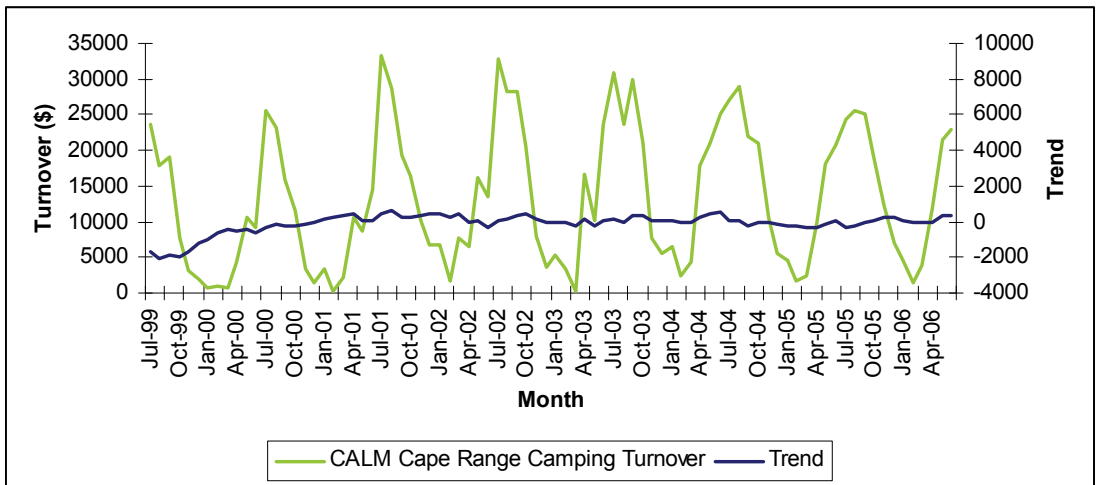


Figure C6 The trend line for the Cape Range camping turnover data

DEC Cape Range visitor counts

The data set for visitor counts is complete between July 2003 up to and including August 2006. If we assume that July 2003 was a peak period we have four peak seasons to compare for analysis. The Cape Range visitor counts were analysed for changes in trend and also compared with other visitor counts collected at Monkey Mia and door counts from the Exmouth Visitor Centre.

Again the strong seasonal component needs to be addressed and was removed using 12-month differencing. The results (see Figure C7) clearly show that the remaining data no longer contains a seasonal component.

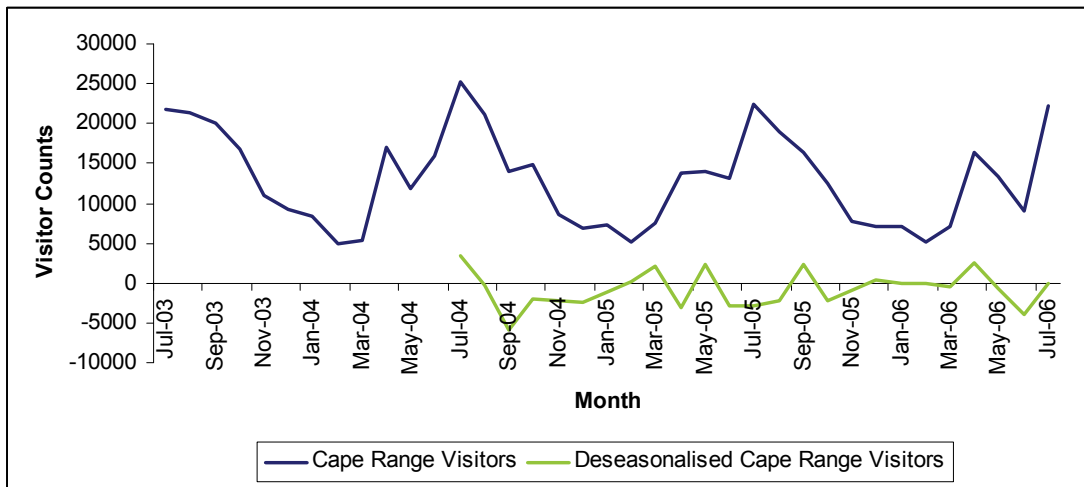


Figure C7 Deseasonalised Cape Range visitor counts

The ACF and the PACF of the deseasonalised data were calculated and the results are given below in Figure C8. As there are no significant values over the 5% significance level we can assume that the deseasonalised data is now stationary and the seasonal pattern explains at least 95% of the data. This confirms that there is no significant trend within the data.

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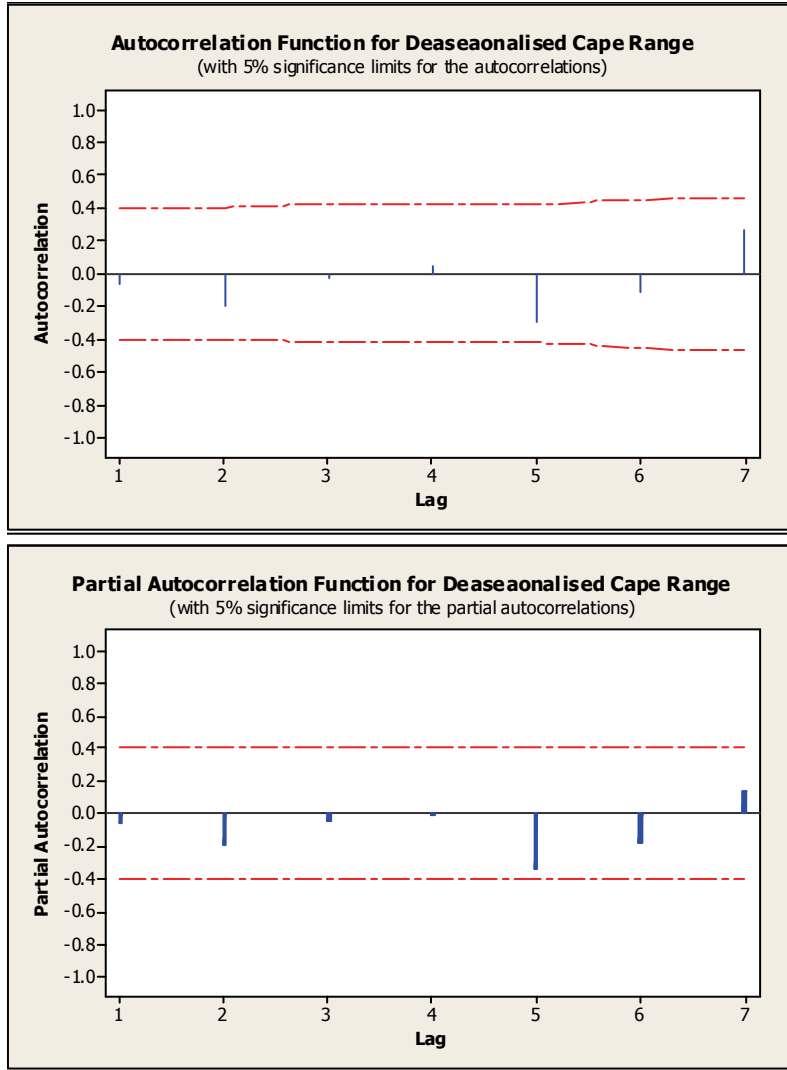


Figure C8 Results of the ACF and PACF on the deseasonalised Cape Range visitor counts

The Winters method was used to calculate the trend using a model that gave an R^2 value of 0.90. The actual values for the Cape Range visitor counts and the trend are shown below in Figure C9. It can be seen that the trend line is relatively stable and confirms the earlier analysis using the 12-month difference that there is no trend in the data.

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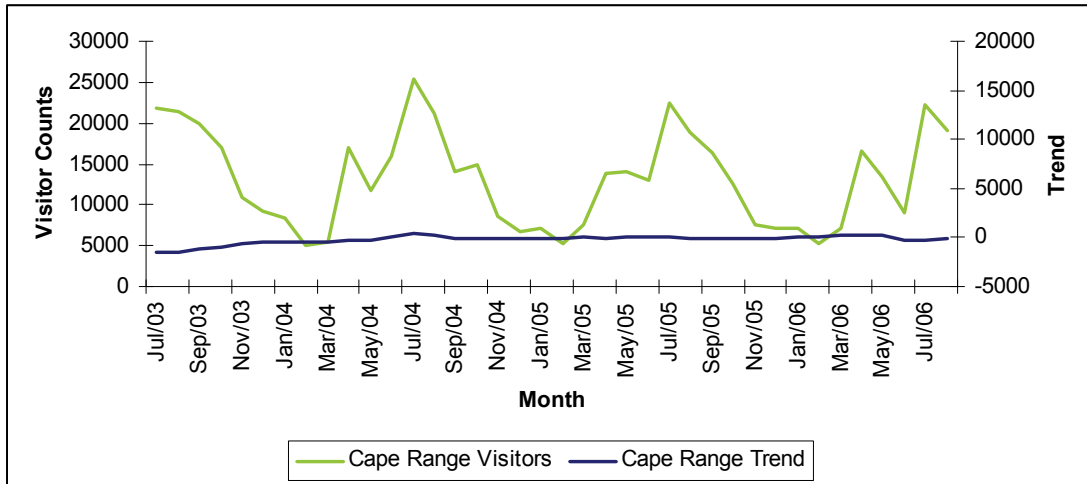


Figure C9 Cape Range visitor counts with associated trend

Visitor counts for Cape Range and Exmouth

To get an overview of the data, the raw data of the Cape Range visitors and the Exmouth Visitor Centre counts are shown below in Figure C10. The raw data provides continuous data for both sets from July 2003 to July 2006. This incorporates four peak periods for comparison. It can be seen that both sets of data have a similar peak and trough pattern, the main difference is that Cape Range has consistently higher numbers of visitors compared to the Exmouth Visitor Centre.

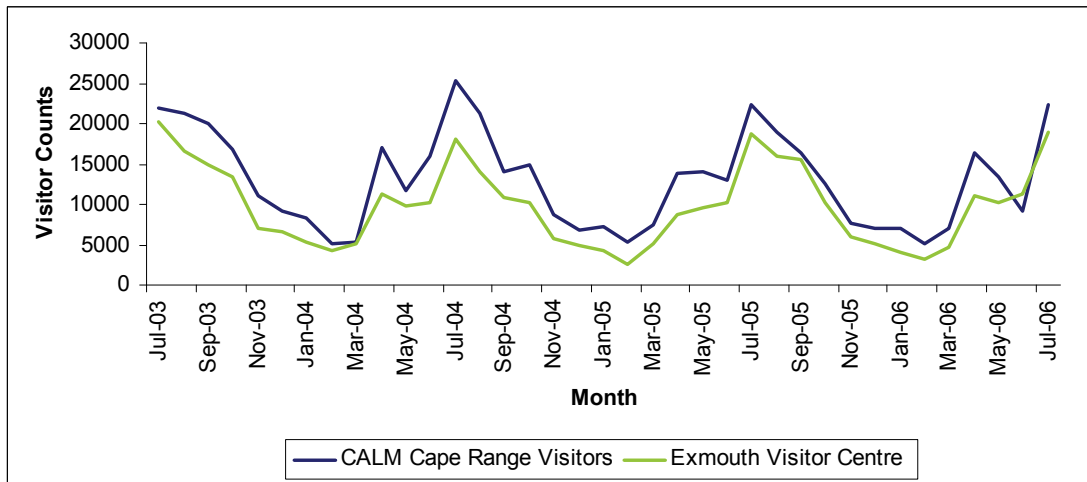


Figure C10 Cape Range visitor and Exmouth Visitor Centre counts

The Winters method was used to calculate the trend for the Exmouth Visitor Centre door counts using a model that gave an R^2 value of 0.95. The actual values for the Exmouth Visitor Centre counts and the trend are shown below in Figure C11. It can be seen that the trend line is relatively stable.

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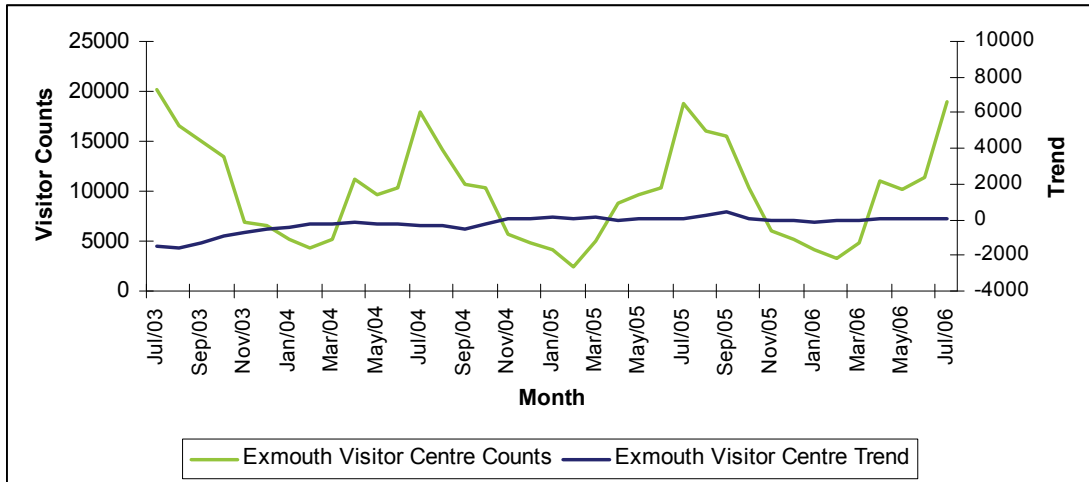


Figure C11 Exmouth Visitor Centre door counts and the associated trend line

Removing the seasonal component from the Exmouth Visitor Centre data allowed the data to be analysed for other components. The ACF and PACF were calculated for the deseasonalised data and the results are shown below in Figure C12.

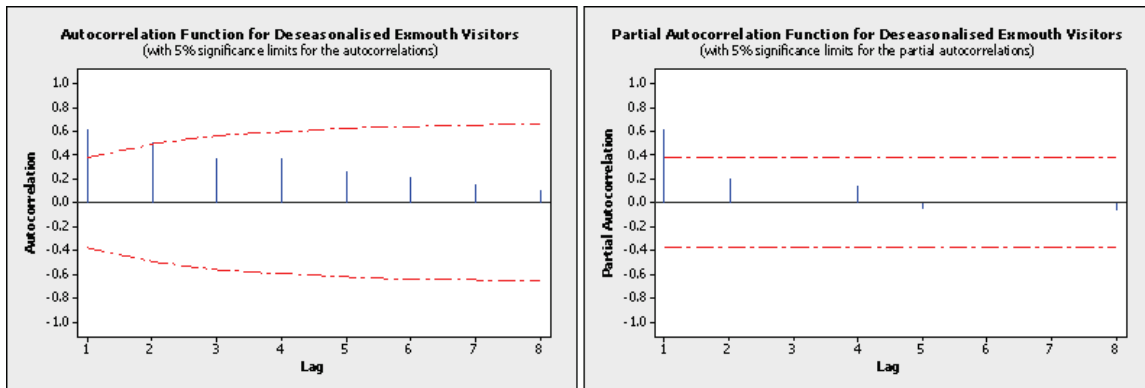


Figure C12 The ACF (left) and PACF (right) for the deseasonalised Exmouth Visitor Centre counts

The Exmouth Visitor Centre counts can be fitted by a Box Jenkins SARIMA (1,0,0) (0,1,0) 12 model, as the deseasonalised data exhibits an autoregressive lag 1 pattern. This appears to be different from the other data sets and it should be noted that this data set probably includes estimates which may have impacted on these results.

The results of the cross correlation function (CCF) for the deseasonalised data are shown in Table C1.

Table C1 The results of the cross correlation for the deseasonalised data for Cape Range visitor counts and the Exmouth Visitor Centre counts

Lag	Cross Correlation Function
-15	-0.09
-14	-0.055
-13	-0.018
-12	-0.115
-11	0.031
-10	0.043
-9	-0.031
-8	0.031
-7	0.108
-6	0.049
-5	-0.045
-4	0.147
-3	0.158
-2	0.225
-1	0.059
0	0.37
1	-0.088
2	-0.138
3	-0.019
4	0.189
5	0.031
6	0.092
7	0.12
8	-0.131
9	-0.207
10	-0.231
11	-0.113
12	-0.27
13	0.173
14	0.192
15	-0.006

The results present no significant cross correlations, as the sample CCF's would need to be greater than plus or minus 0.417 to be considered significant (the strongest correlation that appears is -0.23 for lag 10). This would seem to indicate that there are no similarities in visitor patterns to the two locations. However, it should be noted that this may be due to the relatively small number of data values in the data set. The Visitor Centre data may be more susceptible to marketing/promotion fluctuations and varying rates of utilisation by its key client groups, particularly first-time visitors to the region. Care should therefore be taken before making conclusions without further information.

Comparison of visitor counts for Cape Range and Monkey Mia

The raw data for Cape Range and Monkey Mia visitor counts are shown in Figure C13. The raw data provides continuous data for both sets from July 2003 to August 2006. This incorporates four peak periods for comparison. It can be seen below that both sets of data have a peak and off peak period at similar times of the year, although there appears to be less variation in the number of visitors from peak periods to off peak periods in the Monkey Mia data as explained earlier.

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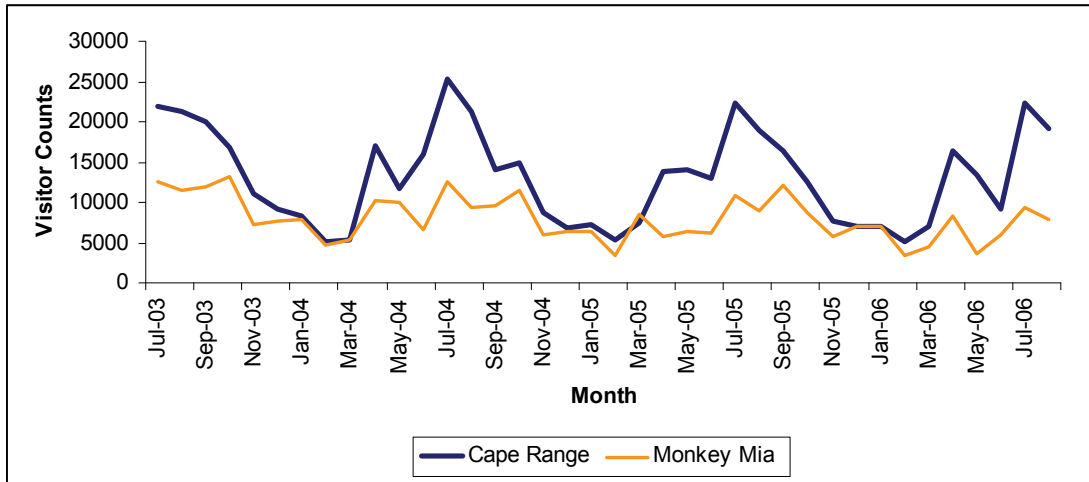


Figure C13 Cape Range and Monkey Mia visitor counts

The Winters method was used to calculate the trend for the Monkey Mia visitor counts using a model that gave an R^2 value of 0.75. The actual values for the Monkey Mia visitor counts and the associated trend are shown below in Figure C14. It can be seen that the trend is relatively stable.

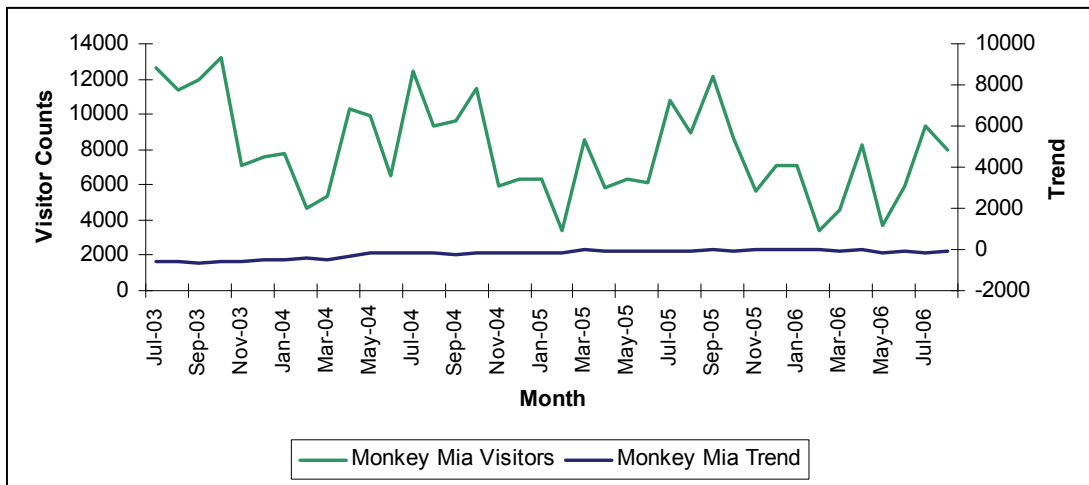


Figure C14 Monkey Mia visitor counts with associated trend

Removing the seasonal component from the Monkey Mia visitor data allowed the data to be analysed for other components. The ACF and PACF were calculated for the deseasonalised data and the results are shown below in Figure C15.

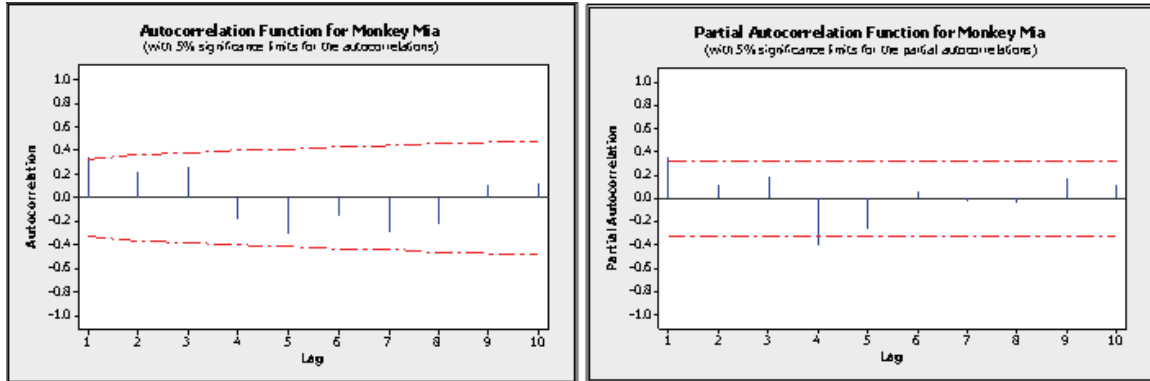


Figure C15 Autocorrelation (left) and partial correlation (right) charts of the deseasonalised data for Monkey Mia visitors

Although the ACF shows no significant values there is a significant value at lag 4 in the PACF which fits with the assumption that the deseasonalised data is a stationary purely random process.

The results of the cross correlation function are shown below in Table C2. The table shows that there are two values that have a significant result. The test statistic is 0.408 which is exceeded at lag 0 (0.449) and at lag 12 (0.414). The R^2 value is 0.202. This indicates that there is a significant relationship between the two data sets at lag 0 and lag 12 implying similar patterns for both data sets.

DEC aerial survey of camping groups

DEC also collects data by aerial surveys of pastoral stations camping groups. These areas include the Bombing range, Ningaloo station, Cardabia station and Warroora station. The data employed for time series analysis were taken from aerial surveys conducted in April each year from 1998 to 2006 and July for the years 1995 to 2006 inclusive. The data is shown graphically below in Figure C16 (for April) and Figure C17 (for July).

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Table C2 The results of the cross correlation for the deseasonalised data for Cape Range visitor counts and the Monkey Mia visitor counts

Lag	Cross Correlation Function
-15	-0.220
-14	0.121
-13	0.172
-12	-0.155
-11	-0.006
-10	0.076
-9	-0.132
-8	0.054
-7	0.033
-6	0.084
-5	-0.198
-4	-0.059
-3	0.255
-2	0.124
-1	-0.103
0	0.449
1	-0.121
2	-0.213
3	-0.096
4	0.165
5	-0.104
6	-0.200
7	0.340
8	0.201
9	-0.138
10	-0.215
11	0.196
12	-0.414
13	0.208
14	-0.001
15	-0.131

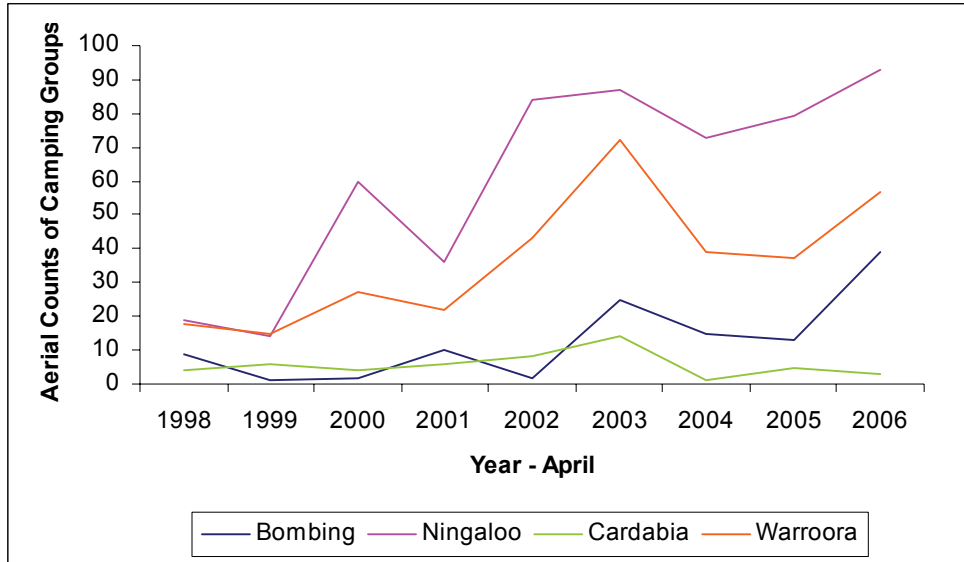


Figure C16 DEC aerial counts of camping groups in April from 1998 to 2006

The counts of camping groups for the stations in April have fluctuated considerably. For the Bombing Range, Ningaloo station and Warroora station, group numbers had a peak in 2003 followed by a sharp decline in 2004, and some stability in 2005 followed by a sharp increase in 2006. The numbers for Cardabia station are considered too small for analysis.

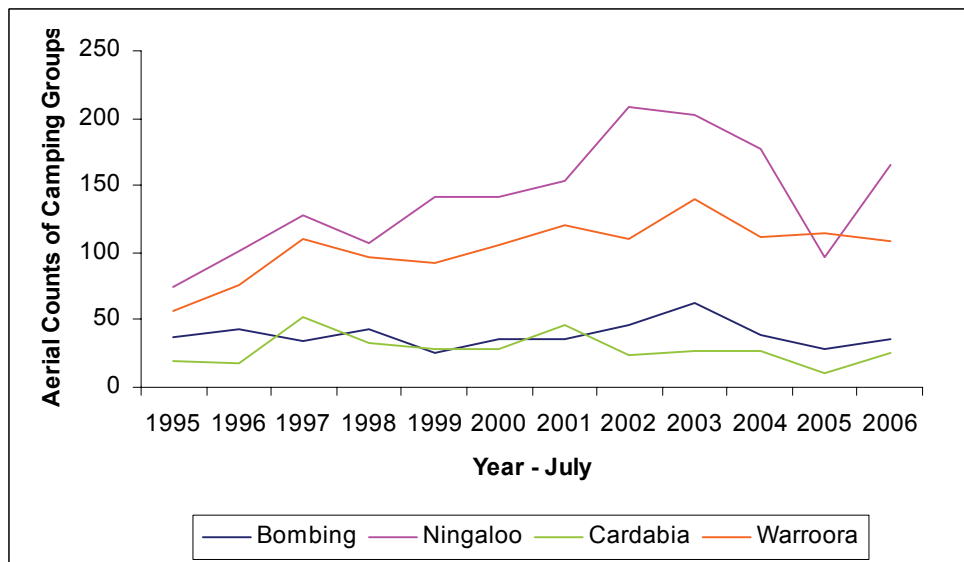


Figure C17 DEC aerial counts of camping groups in July from 1995 to 2006

For July, all stations except Warroora showed an increase in numbers of camping groups in 2006, particularly Ningaloo which suffered a marked decline in 2005. Warroora's counts have remained relatively steady over the last three years.

Another way to analyse the data is to consider the total figures by combining the four stations but still keeping April and July separate, shown in Figure C18. Using regression analysis, a trend line was calculated and the results are graphed below. The R^2 (correlation) value for July is 0.32, and it appears that the upward

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trend is influenced by the strong increase in numbers from the period 1999 to 2003. The April trend on the other hand shows a steady upward trend and has an R² value of 0.70.

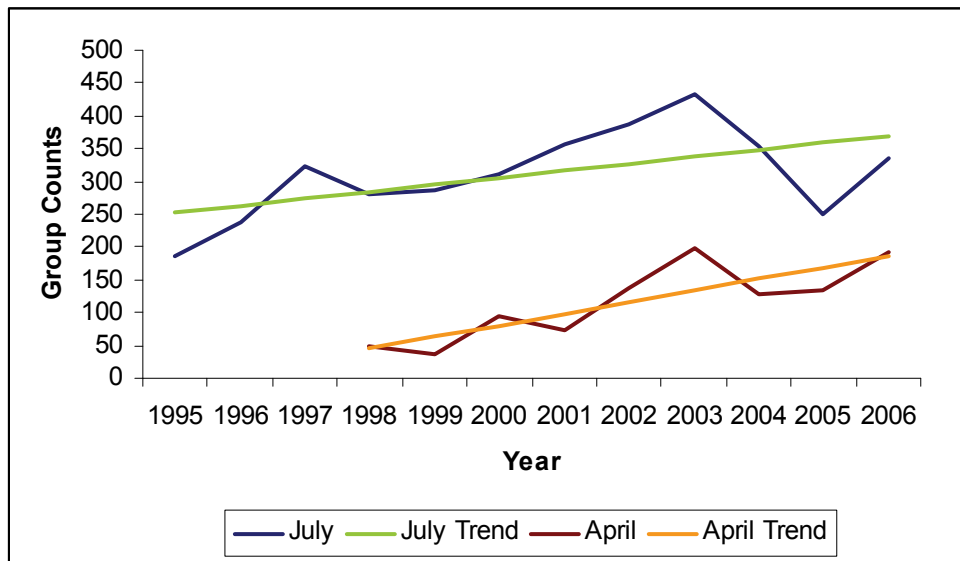


Figure C18 Trend line for camping groups in July for all stations

Metro fuel prices

Another matter investigated was impacts from rising fuel prices. The fuel prices in the Perth metropolitan area have risen steadily over the last few years and considering the distances needed to travel to visit the Ningaloo region it is important to recognise that this may be an important factor in the numbers of visitors to the region. The Cape Range camping turnover data was compared to the average Perth metropolitan diesel (metro diesel) and metropolitan petrol (metro fuel) prices. A model was fitted to the actual turnover data using Winters method and the calculated trend line is shown below in Figure C19. The fitted values of the model gives an R² value of 0.87.

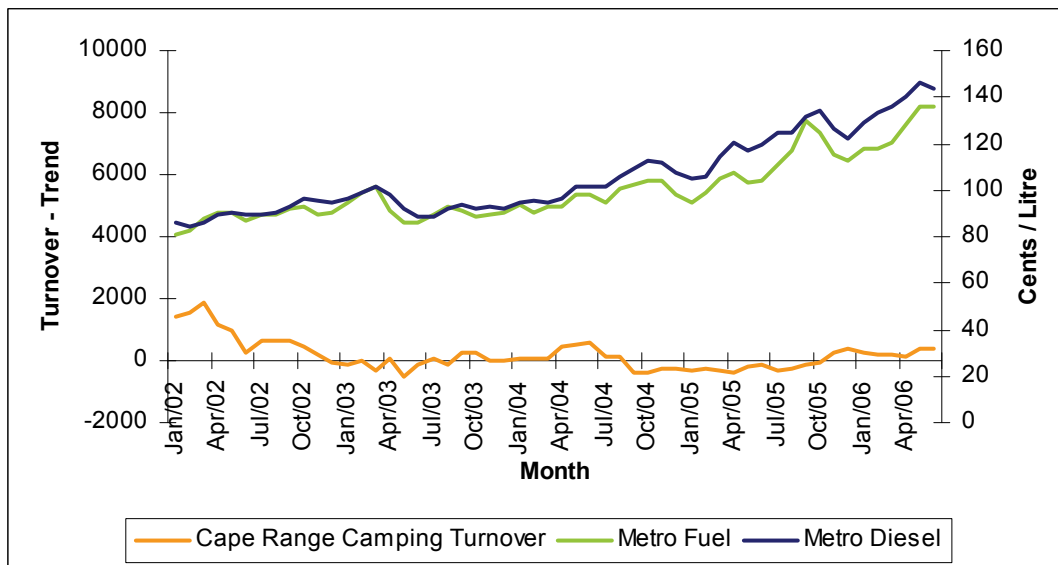


Figure C19 Metro diesel and fuel prices and the trend line for the Cape Range camping turnover data

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We might expect to see some indication that as fuel prices have been steadily increased that there would be a corresponding decrease in the amount of turnover; however, this does not appear to be the case. The correlation coefficient calculated for metropolitan fuel and the Cape Range turnover trend values gives an R^2 value of .07. Similarly the correlation coefficient for metropolitan diesel and the trend data gives an R^2 value of 0.11. This confirms that the fuel costs are not correlated with the Cape Range camping turnover.

The data for Cape Range visitor counts was also compared to metro diesel and metro petrol (fuel) prices. A model was fitted to the actual visitor data using Winters method and the calculated trend line is shown below in Figure C20. The fitted values of the model gives an R^2 value of 0.89.

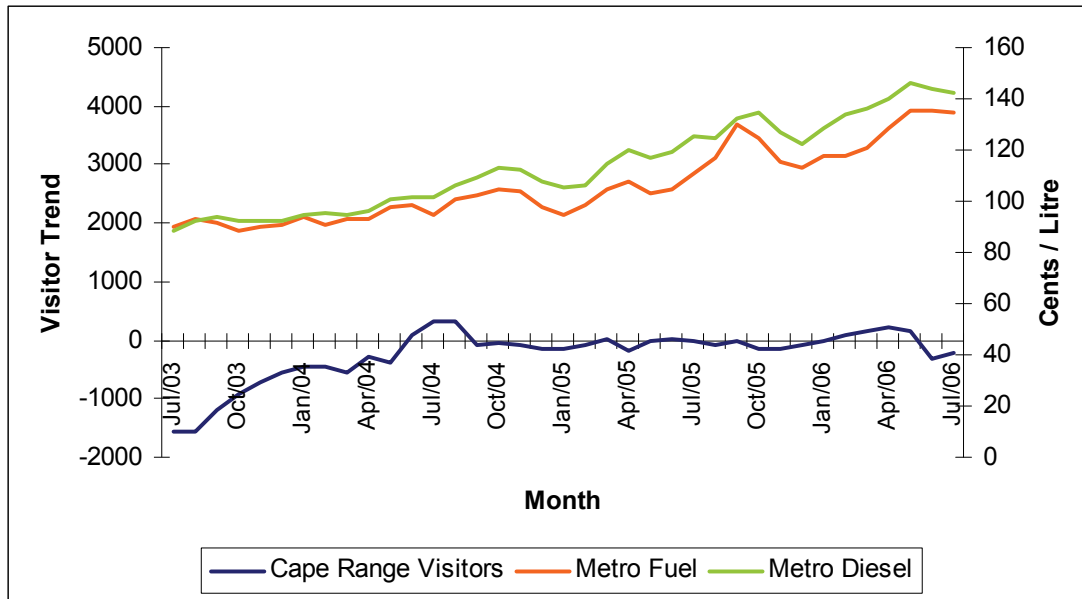


Figure C20 The trend line for the Cape Range visitor data together with metro fuel and diesel prices

The result is similar to the Cape Range turnover data, where there is no significant correlation between the fuel/diesel price and the visitor counts. The correlation coefficient calculated for metro fuel and the Cape Range visitor trend values gives an R^2 value of .25 and the correlation coefficient for metro diesel and the trend data gives an R^2 value of 0.36. This result indicates that fuel is not a significant factor affecting Cape Range visitor counts.

Finally, the data for the Exmouth Visitor Centre counts was compared with metro diesel and metro petrol (fuel) prices. A model was fitted to the actual visitor data using Winters method and the calculated trend line is shown below in FigureC21. The fitted values of the model give an R^2 value of 0.95.

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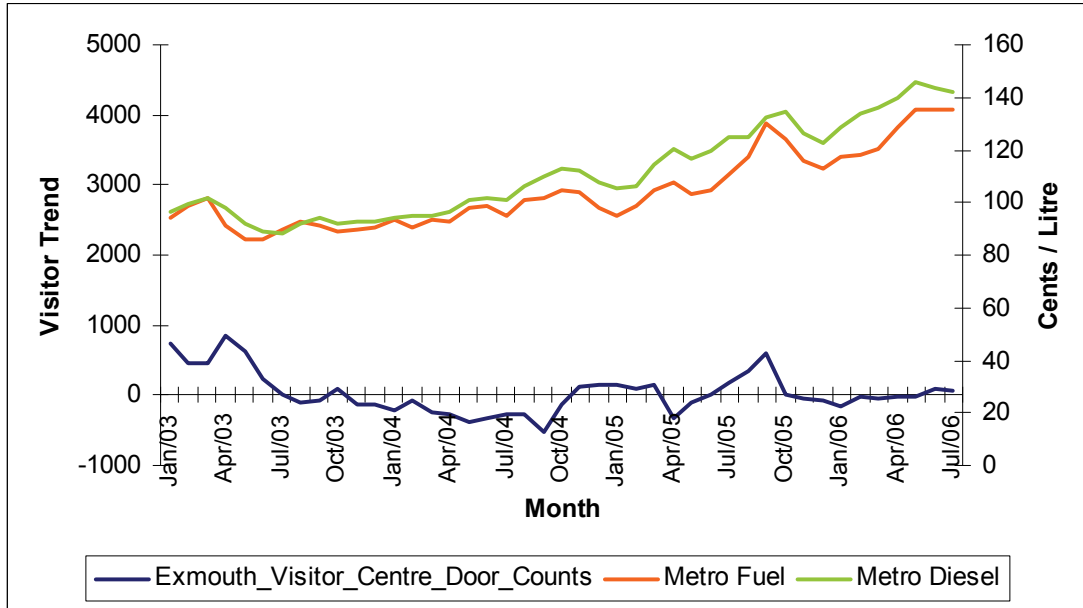


Figure C21 The trend line for the Exmouth Visitor Centre data together with metro fuel (petrol) and metro diesel prices

Correlation between metro fuel and the trend for Cape Range visitors gives an R^2 value of .00 and the correlation between metro diesel and the trend for Cape Range visitors gives an R^2 value of .00. This result indicates that fuel is not a significant factor affecting Exmouth Visitor Centre door counts.

Summary

All the data sets contained a strong seasonal pattern which was removed to better understand other components of the data. A comparison between visitor counts for Cape Range and Monkey Mia showed similar patterns and were significantly correlated for both the original and deseasonalised data. In all but the Exmouth Visitor Centre count data (which exhibited an artificial pattern), the deseasonalised data was shown to be a purely random process with the Exmouth deseasonalised data corresponding to an autoregressive model of lag 1.

The results of the time series indicate that the trends identified in Chapter 5 are generally insignificant from a statistical point of view and that the majority of variability in the time-series data for selected indicators in recent years is attributable to seasonality rather than sustained rises or falls in visitation levels. Of course, it is possible that there have been significant changes in particular visitor markets, with some visitor segments declining while others have grown. If so, the selected indicators would probably be too generalised to detect these changes, and consequently would not register in the time series analysis. From a monitoring point of view, it is important to develop more fine-tuned indicators that are sensitive to shifts in different visitor segments. The time-series data is an important source of baseline data for the Ningaloo region, and will be useful for follow-up assessment in future studies.

APPENDIX D: 2006 Ningaloo Wilderness Camping Survey

** Please note that this is an anonymous questionnaire. Please ensure that you do not write your name, or any other comments that will make you identifiable, on the questionnaire. By completing the questionnaire you are consenting to take part in this research. As such you should first read the Information Letter carefully as it explains fully the intention of the research project.*

Please tick (✓) one box

1. Where are you camping?

- Cape Range National Park Pastoral Station somewhere else unsure

(Please specify name of the camp _____)

2. Is this your **first** visit to the Ningaloo area?

- Yes No Unsure

3. What year did you **first** visit the area? _____

4. Approximately how many times have you visited the Ningaloo area? _____

5. How many days do you intend to camp in the place you are staying (counting from arrival)? _____

6. What type of group are you visiting the area with?

- By yourself
- With friends
- With spouse or partner
- With family
- With a club
- With a tour group
- Other (please specify) _____

7. How many people are in your group (including yourself)? _____

8. Did you bring a boat with you?

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Yes No

9. What type of vehicle did you travel to the camp in?

- 2WD 2WD and caravan
- 4WD 2WD and caravan*
- Camper van Other (please specify) _____

*Note: 2WD should have read as 4WD

10. For the following items, please indicate the **maximum** amount in **numbers** that you would accept:

Item	Maximum acceptable amount in numbers
Amount of erosion (%) at this site	
Amount (m ²) of vegetation loss at this site	
Pieces of litter at this site	
Number of roadkills seen on any one day in the area	
Number of fish (per person per day) taken from the sea from fishing in the Marine Park	
Amount of area (%) of the Marine Park to be off-limits to fishing (currently 28% is off-limits)*	
Number of campers at this site	

*Note: Sanctuary zone area is actually 34%, and is even higher when previous Marine Park boundaries are considered.

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11. Which of the following activities have you/do you intend to participate in during your stay?

- | | | | |
|-------------------|--------------------------|-----------------------------------|--------------------------------|
| Swimming | <input type="checkbox"/> | Walking/hiking | <input type="checkbox"/> |
| Snorkelling | <input type="checkbox"/> | Picnicking | <input type="checkbox"/> |
| Scuba Diving | <input type="checkbox"/> | Four-wheel driving | <input type="checkbox"/> |
| Shore Fishing | <input type="checkbox"/> | Viewing wildlife (marine or land) | <input type="checkbox"/> |
| Boat Fishing | <input type="checkbox"/> | Tours | <input type="checkbox"/> |
| Canoeing/Kayaking | <input type="checkbox"/> | Surfing/windsurfing | <input type="checkbox"/> |
| Boating | <input type="checkbox"/> | Other (please specify) | <input type="checkbox"/> _____ |

12. Do you intend to visit the Ningaloo area again in the future? Yes No

13. Where do you live (if Australian please enter **postcode**, otherwise country of origin)? _____

14. How old are you? _____ years

15. Are you: male female

16. What is your current employment status?

- | | | | |
|---------------------|--------------------------|------------------------|--------------------------------|
| Working (casual) | <input type="checkbox"/> | Retired | <input type="checkbox"/> |
| Working (part time) | <input type="checkbox"/> | Student | <input type="checkbox"/> |
| Working (full time) | <input type="checkbox"/> | House duties | <input type="checkbox"/> |
| Unemployed | <input type="checkbox"/> | Other (please specify) | <input type="checkbox"/> _____ |

17. Are you aware that the sanctuary zones in Ningaloo Marine Park were increased in December 2004?

Yes No Unsure

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18. If you visited the area before December 2004, has the expansion of the sanctuary zones changed your activities in any way?

- No change
- Some change (briefly how) _____
- Much change (briefly how) _____
- Not sure

19. From the list below indicate how supportive you are of the expansion of the sanctuary zones that took place?

- Strongly opposed (briefly why) _____
- Opposed (briefly why) _____
- Neutral (briefly why) _____
- Supportive (briefly why) _____
- Strongly supportive (briefly why) _____

20. How important is **fishing** to the enjoyment of your visit?

- not important of little importance neutral of some importance
 extremely important

21. How would you rate the quality of your camping experience?

- terrible poor average good excellent

Would you like to make any comments about the quality of your stay?

What is today's date? _____

Thank you for completing this survey.

APPENDIX E: 2005 Exmouth Resident Survey Questions (Sanctuary Zone Component)

The following questions were incorporated by the project team into Colin Ingram’s Exmouth resident survey.

Which of the following activities do you undertake in Cape Range National Park and Ningaloo Marine Park and how important are they to you? Please circle the number on the scale that best represents your view.

	Not at all important			very important			
<input type="radio"/> fishing	1	2	3	4	5		Unsure
<input type="radio"/> swimming	1	2	3	4	5		Unsure
<input type="radio"/> snorkelling/diving	1	2	3	4	5		Unsure
<input type="radio"/> boating/sailing	1	2	3	4	5		Unsure
<input type="radio"/> canoeing/kayaking	1	2	3	4	5		Unsure
<input type="radio"/> bushwalking/hiking	1	2	3	4	5		Unsure
<input type="radio"/> wildlife viewing/bird watching	1	2	3	4	5		Unsure
<input type="radio"/> sightseeing	1	2	3	4	5		Unsure
<input type="radio"/> picnicking/BBQing	1	2	3	4	5		Unsure
<input type="radio"/> relaxing/reading	1	2	3	4	5		Unsure
<input type="radio"/> climbing/abseiling	1	2	3	4	5		Unsure
<input type="radio"/> cycling	1	2	3	4	5		Unsure
<input type="radio"/> camping	1	2	3	4	5		Unsure
<input type="radio"/> Other, please specify.....	1	2	3	4	5		Unsure

How often did you visit the Ningaloo Marine Park/Cape Range National Park in the following periods?

Dec 2003 – May 2004	June – Nov 2004	Dec 2004 – May 2005	
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Never
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1–2 times
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3–4 times
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5–10 times
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	11–20 times
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Over 20 times

Are you aware of the recent expansion of sanctuary zones and boundaries of the Ningaloo Marine Park? yes no

	strongly disagree			strongly agree		
Please indicate how much you agree or disagree with the current zoning and boundary arrangements for Ningaloo Marine Park?	1	2	3	4	5	Unsure

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<p>In what ways have the sanctuary zones and boundaries in the Ningaloo Marine Park affected your business?:</p> <p>1. (prior to their expansion in 2004)</p> <p>2. (since their expansion in 2004)</p>

<p>To what extent do you agree or disagree that the sanctuary zones and boundaries of the Ningaloo Marine Park have had a positive effect on the local economy:</p> <p>a) since their creation in 1987?</p> <p>b) since their expansion in 2004?</p>	strongly disagree				strongly agree	
	1	2	3	4	5	Unsure
	1	2	3	4	5	Unsure

<p>What activities do you or members of your household carry out in Ningaloo Marine Park?</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>

<p>Have recent changes to sanctuary zones and boundaries of the Ningaloo Marine Park had an effect on your activities or those of members of your household?</p>	<p><input type="radio"/> yes <input type="radio"/> no <input type="radio"/> not sure</p>
<p>If so, how?</p> <p>.....</p> <p>.....</p>	

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The STCRC has grown to be the largest, dedicated tourism research organisation in the world, with \$187 million invested in tourism research programs, commercialisation and education since 1997.

The STCRC was established in July 2003 under the Commonwealth Government's CRC program and is an extension of the previous Tourism CRC, which operated from 1997 to 2003.

Role and responsibilities

The Commonwealth CRC program aims to turn research outcomes into successful new products, services and technologies. This enables Australian industries to be more efficient, productive and competitive.

The program emphasises collaboration between businesses and researchers to maximise the benefits of research through utilisation, commercialisation and technology transfer.

An education component focuses on producing graduates with skills relevant to industry needs.

STCRC's objectives are to enhance:

- the contribution of long-term scientific and technological research and innovation to Australia's sustainable economic and social development;
- the transfer of research outputs into outcomes of economic, environmental or social benefit to Australia;
- the value of graduate researchers to Australia;
- collaboration among researchers, between researchers and industry or other users; and efficiency in the use of intellectual and other research outcomes.